Major Appliance Industry Facts Book

A comprehensive reference on the United States major home appliance industry

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The United States major home appliance industry contributes to the well-being of the nation's economy and the nation's citizens. This book is a comprehensive collection of facts defining the industry, its market and products.

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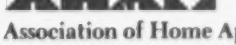

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The Industry's Products

2 Manufacturing of Appliances

The major home appliance industry produces and sells products which use either gas or electric energy to perform one of five basic household functions:

- Food Preservation and Storage
- Cooking
- Home Laundry
- Kitchen Clean-up
- Home Comfort.

These major home appliance products* are:

- Ranges and Ovens (gas and electric)
- Microwave Ovens
- Clothes Washers
- Clothes Dryers (gas and electric)
- Dishwashers
- Food Waste Disposers
- Trash Compactors
- Refrigerators
- Freezers
- Room Air Conditioners
- Dehumidifiers.

*Refer to Appendix 1 for Standard Industrial Classification Codes for these products. Refer to Appendix 2 for a listing of other home appliance products.

An estimated 48 companies currently produce major home appliances in the United States for both the domestic and export market.** Consolidation and dissolution of companies over the past 40 years have resulted in a decreasing number of manufacturers. For example, 60 companies produced clothes washers in the United States in 1916. Only seven manufacture this appliance today.

Table 1 shows, by product, the number of companies and plants engaged in appliance manufacturing in the United States.

Employment

Major home appliance manufacturers directly employ 104,500 people, of whom 82,000 (78%) are production or factory workers. (Table 2) This number does not include the thousands of other people engaged in the production of materials, components and other supplies used in the manufacturing of the finished product nor those who transport, sell or service appliances.

Table 1. United States Companies and Plants Manufacturing Major Home Appliances

Major Appliance Product	Number of Companies	Number of Plants
Room Air Conditioners	8	21
Dehumidifiers	7	
Ranges and Ovens	26	96
Microwave Ovens Ranges	12	
Refrigerators	18	42
Freezers	9	
Laundry Equipment	7	32
Dishwashers	8	14
Compactors	10	
Disposers	5	

Sources: AHAM, Bureau of the Census

The general decline in production workers, especially notable in refrigerator and freezer manufacturing, results from increasing productivity and new manufacturing processes and equipment.

**Appendix 3 provides a matrix identifying the respective lines of major appliance manufacturing companies which are members of the Association of Home Appliance Manufacturers (AHAM).

Productivity

Productivity measures output per employee hour, but reflects the joint effects of many influences including new manufacturing technology, capital investment, the level of output, capacity utilization and the efforts and skills of both managers and the work force.

Essentially, productivity describes the efficiency of the overall manufacturing process. Greater efficiency ultimately translates into lower prices for consumers, since manufacturers produce more goods at the same cost, or the same volume of goods at reduced cost. In either case, the cost per unit of output is lower.

Table 3 compares the average annual increases in output per employee hour in total manufacturing, durable goods manufacturing, major household appliances and selected specific major appliance products.

Over the long-term (1958 through 1983), annual output per employee hour for total manufacturing increased 2.7% per year while durable goods manufacturing increased 2.4%. However, output for the major appliance industry increased 4.4%.

Over the short-term (1982 to 1983), the major appliance industry produced 17.6% more products per employee hour, the sharpest annual productivity increase for the industry since 1958. This 17.6% gain compares to a 4.3% gain for total manufacturing and a 5.6% gain for all durable goods manufacturing.

Table 2. Employment in the Major Home Appliance Industry
Number of Workers (000 omitted)

	Refrigerator & Freezer		Home Laundry		Other *		Total Major Appliance	
	All Employees	Production Workers	All Employees	Production Workers	All Employees	Production Workers	All Employees	Production Workers
1973	66.1	53.7	30.0	24.3	65.2	50.5	161.3	128.5
1974	49.1	39.4	27.8	21.8	57.5	43.7	134.4	104.9
1975	37.1	28.4	22.4	16.9	49.7	36.9	109.2	82.2
1976	35.5	26.9	24.5	19.2	56.2	43.7	116.2	89.8
1977	44.2	34.5	22.5	17.4	61.2	47.6	127.9	99.5
1978	45.4	35.9	23.1	18.1	62.9	49.0	131.4	103.0
1979	38.7	31.1	22.6	17.7	62.8	48.9	124.1	97.7
1980	32.0	25.7	20.4	15.9	58.3	44.8	110.7	86.4
1981	32.7	26.6	21.4	16.7	56.1	43.2	110.2	86.5
1982	26.1	20.5	19.4	14.4	51.9	39.5	97.4	74.4
1983	25.3	20.1	23.5	18.2	55.7	43.7	104.5	82.0

*Includes household cooking equipment, household water heaters, dishwashers, disposers, compactors, floor-waxing and floor-polishing machines, vacuum cleaners, sewing machines.

Source: Bureau of Labor Statistics

Table 3. Average Annual Percentage Productivity Increase (output per employee hour*)

	1958-1983**
Total Manufacturing	+2.7%
Durable Goods Manufacturing	+2.4
Major Household Manufacturing	+4.4
Household Cooking Equipment	+3.5
Household Refrigerators & Freezers	+5.2
Household Laundry Equipment	+4.2

*The output measures underlying the index relate to the total production of the industry. They do not relate to the specific output of any single group of employees.

**Average annual percentage change.

Source: Output, employment and hours based on data from the Bureau of the Census and the Bureau of Labor Statistics.

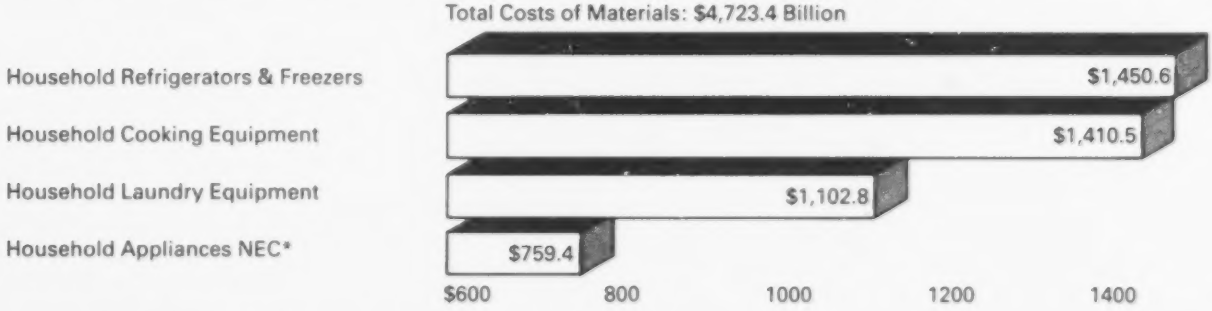
Materials and Components

Each year the United States major home appliance industry spends over $4.7 billion for components and materials. (Table 4) The production of major appliances involves the annual use* of

- 118,000 tons of aluminum,
- 203,200 tons of plastics,
- 1,520,000 tons of steel,
- 37,500 tons of gaskets,
- 127,540,000 die castings,
- 81,830,000 knobs and dials,
- 103,000,000 switches,
- 33,300,000 thermostats,
- 24,800,000 timers,
- 565,000,000 electrical connectors,
- 49,900,000 motors,
- 156,500,000 labels and nameplates,
- 274,000 miles of electrical wire,
- 4,141,400,000 fasteners,
- 10,500,000 gallons of paint,
- 25 square miles of porcelain enamel, and
- 76 square miles of corrugated fiberboard.

*Source: *Appliance Manufacturer Magazine*, January, 1980, page 118.

Table 4. 1982 Cost of Materials and Components in Appliance Production (In Billions)



*Includes household water heaters, dishwashers, disposers, compactors, floor-waxing and floor-polishing machines.
Source: 1982 Census of Manufacturers

Capital Expenditures

Table 5 shows total capital expenditures from 1967 to 1982 for the industry as well as for individual appliance categories. The increased expenditures of recent years reflect movements into Computer Aided Design/Computer Aided Manufacturing (CAD/CAM) and such production innovations as robotics and laser beams both on the production line and in quality control checks throughout the manufacturing process.

Table 5. United States Major Home Appliance Industry New Capital Expenditures (in millions of dollars)

	Household Appliances NEC*	Laundry Equipment	Refrigerator/ Freezers	Cooking Equipment	Total
1967	10.7	31.8	37.3	8.6	$ 88.4
1968	13.2	26.0	33.0	15.8	$ 88.0
1969	14.3	30.7	47.8	11.9	$104.7
1970	13.5	27.7	41.5	35.1	$117.8
1971	11.4	18.6	26.2	35.0	$ 91.2
1972	18.3	31.0	25.5	25.5	$100.3
1973	27.2	32.9	23.6	32.4	$116.1
1974	16.5	48 4	43.3	18.2	$126.4
1975	15.2	43.0	33.8	20.4	$112.4
1976	13.0	45.0	47.4	35.6	$141.0
1977	24.6	27.3	46.9	36.1	$134.9
1978	29.9	33.4	73.3	35.8	$172.4
1979	28.2	32.0	38.6	41.5	$140.3
1980	23.6	45.6	55.4	49.8	$174.4
1981	33.7	43.5	55.8	57.7	$190.7
1982	40.0	34.7	78.4	51.5	$204.6

*Includes household water heaters, dishwashers, disposers, compactors, floor-waxing and floor-polishing machines.

Source: 1982 Census of Manufacturers

Manufacturer Sales

Table 6 lists total 1983 manufacturers' sales in dollars for appliance products, excluding excise tax (if any), freight charges or extended warranty costs.

Table 6. Estimated 1983 Major Home Appliance Industry Dollar Sales (manufacturer dollar value)

Product	Dollar Value
Electric Ranges & Cooktops	$ 970,990,000
Gas Ranges	$ 407,407,000
Microwave Ovens	$1,452,306,000
Clothes Washers	$1,189,880,000
Clothes Dryers	$ 652,520,000
Dishwashers	$ 702,304,000
Disposers	$ 151,657,000
Compactors	$ 33,377,000
Refrigerators	$2,285,923,000
Freezers	$ 339,879,000
Room Air Conditioners	$ 564,423,000
Dehumidifiers	$ 59,883,000
Total	**$8,840,549,000**

Source: AHAM

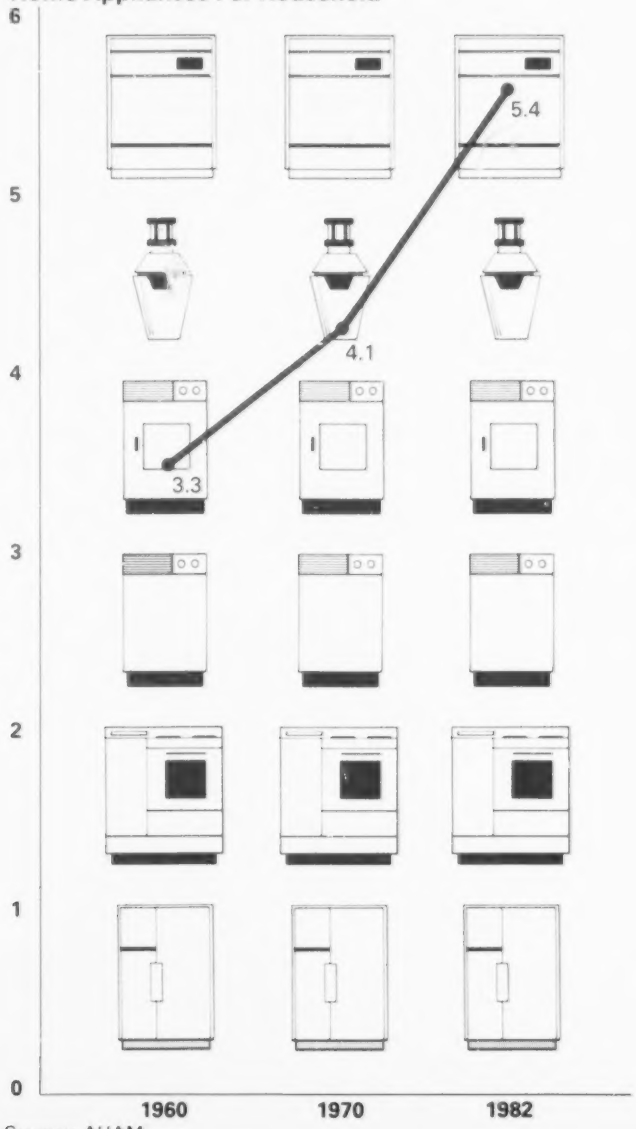
The Marketing and Distribution of Appliances

Appliance Marketing

Appliance Ownership. Over 400 million major appliances are in use today in American homes. The average household has at least five, which most often are a refrigerator, range, clothes washer and dryer, and either a dishwasher or disposer. (Figure 1)

Table 7 provides the ownership levels of major appliances for 1960, 1970 and 1982. Refrigerators and ranges (either gas or electric) are found in virtually every American household. Room air conditioner ownership has remained at relatively the same level over the last 10 years. Saturation levels of dishwashers, disposers, freezers and clothes dryers have significantly increased and continue to show good first-purchase sales potential. Microwave ovens, having the fastest growing ownership, are expected to reach at least 50% saturation by 1985 or 1986.

Figure 1. Average Number of Major Home Appliances Per Household



Source: AHAM

Table 7. Major Home Appliance Ownership
Number & Percentage of United States Households with Product

	Number in Millions	Percentage	Number in Millions
		1960*	1970**
Refrigerators	49.6	93.4%#	63.3
Washers	39.0	73.5	45.1
Wringer	17.4	32.8	7.1
Automatic & Semi-Automatic	20.7	39.0	38.0
Washer-Dryer Combination	.9	1.7	NA
Dryers	9.1	17.3	26.4
Electric	6.3	11.9	18.6
Gas	2.8	5.4	7.8
Electric Ranges	18.4	34.8	25.8
Disposers	4.8	9.1#	16.3
Dishwashers	3.2	6.0#	12.0
Freezers	9.8	18.4	17.9
Gas Ranges	34.1	64.4	36.6
Room Air Conditioners	5.6	10.5	16.9
Microwave Ovens	NONE	NONE	NEG.
Dehumidifiers	NA	NA	NA
Compactors	NONE	NONE	NEG.
Total	**173.6**		**260.3**

Percentage	Number in Millions	Percentage
	1982***	
99.8%#	83.4	99.9
71.1	61.5	73.6
11.2	NA	NA
59.9	NA	NA
NA	NA	NA
41.6	54.6	65.3
29.3	42.3	50.6
12.3	12.3	14.7
40.6	48.4	58.0
25.7#	41.5	49.7
18.9	37.2	44.5
28.2	35.7	42.8
57.7	35.7	42.7
25.0##	22.6	27.0
NEG.	21.4	25.6
NA	9.2	11.0
NEG.	2.6	3.1
	453.7	

*1960 appliance saturation data, 1960 Bureau of the Census except: # — *Merchandising Week* data, number of households with product based on Census Bureau estimates of 53,013,000 occupied housing units in 1960.

**1970 appliance saturation data, 1970 Census of Housing Series HC(S1)-6 except: # — *Merchandising Week* data, number of households with product based on Census Bureau estimates of 63,449,747 occupied housing units in 1970. ## — Census Bureau estimates of 67,693,842 year round housing units in 1970.

***1982 appliance saturation data, *Appliance Magazine,* October, 1983; number of households with product based on Census Bureau estimate of 83,527,000 occupied housing units in 1982.

NEG. = Negligible NA = Not Available

The Domestic Market. Replacement purchases, first purchases and new home construction primarily shape the domestic appliance market. Replacement purchases generally account for 70% of all appliance sales. First time purchases relate to the formation of new households (families) and those appliances with lower saturation.

Approximately 70% of all major appliances are purchased directly by the consumer (or end-user) with the remainder purchased by a builder or landlord. Table 8 shows the percentage of appliance sales attributed to direct home builder purchases. (1979 is the most recent year which best represents a typical year of new home construction.) The percentages vary by product type. For example, about four out of 10 disposers, ranges and dishwashers are purchased by builders, compared to only 13% of refrigerators and 3% of clothes washers.

Table 8. Use of Appliances in New Housing

	Housing Units with Builder Installed Appliances		Total 1979 Industry Appliance Sales	
Product	**Percent of Total Housing Units[1]**	**Number of Appliances[2]**	**Number of Appliances[3]**	**Builder Units As Percent of Total[4]**
Disposers	75.2%	1,406.4	3,211.8	43.8%
Electric Ranges & Ovens	67.9	1,270.7	2,977.2	42.7
Dishwashers	72.2	1,350.2	3,388.2	39.9
Compactors	4.6	85.7	279.5	30.7
Refrigerators	35.6	665.7	5,301.8	12.6
Clothes Dryers	7.7	144.5	3,475.0	4.2
Clothes Washers	7.0	131.5	4,601.0	2.9
Room Air Conditioners	2.8	51.6	2,830.4	1.8
Microwave Ovens	0.1	2.6	2,447.0	0.1
Freezers	—	—	1,773.6	0.0
Total		5,108.9	30,285.5	16.9%

Source:

1) 1979 Housing Industry Dynamics Survey of Builder Installation Practices, approximately 4,500 respondents.

2) Calculated using the percentages in Column 1 and new private housing completions of 1,870,800 units in 1979 as published in April, 1982 *Economic Indicators* prepared by the Council of Economic Advisors.

3) Association of Home Appliance Manufacturers reports of 1979 total industry distributor sales.

4) Data in Column 2 divided by data in Column 3.

Foreign Trade. The number of major appliances *exported* in 1980 was almost quadruple the export total of 10 years earlier. (Table 9) However, since 1980, exports have decreased each successive year with 1983 exports at half the 1980 level. In 1983, the most exported major appliance was the room air conditioner and the least exported, the freezer.

Imported major appliances increased from 1970 to 1983. Imports in 1983 were four times the total number of units imported in 1970. Microwave ovens, the leading imported product, accounted for 70% of the 1983 total. (Table 10)

Table 9. United States Major Home Appliance Exports

Product Descriptions	Number of Units				
	1970	1980	1981	1982	1983
Room Air Conditioners (Window & Wall Type)					
Under 10,000 Btu/Hr	99,028	201,906	144,730	90,588	46,756
10,000-16,999 Btu/Hr	207,951	288,989	218,719	122,270	70,708
17,000 Btu/Hr and over		314,974	349,531	267,241	109,692
Total	306,979	805,869	721,980	480,099	227,156
Refrigerators & Refrigerator/Freezers					
Under 13.5 cu. ft.	16,740	68,379	81,394	68,011	52,080
13.5 cu. ft. and over		273,580	248,126	179,182	136,495
Total	16,740	341,959	329,520	247,193	188,575
Clothes Washers					
Non-automatic	16,931	72,101	37,296	21,562	28,045
Automatic	57,382	118,545	141,508	128,759	114,664
Total	74,314	190,646	178,804	150,321	142,709
Disposers	NA	154,853	149,215	127,158	120,391
Microwave Ovens	NA	96,619	122,927	68,644	86,921
Dishwashers	49,631	124,931	78,117	52,313	63,166
Electric Ranges	20,080	109,471	92,729	80,955	55,569
Clothes Dryers	29,271	49,329	56,305	47,791	47,606
Freezers	15,323	53,578	48,578	30,022	26,321
Total U.S. Exports	**512,337**	**1,927,247**	**1,769,175**	**1,284,496**	**958,414**

Source: Department of Commerce, EM546 Report

Table 10. United States Major Home Appliance Imports

Product Descriptions	Number of Units				
	1970	1980	1981	1982	1983
Microwave Oven/Ranges	NA	864,596	1,177,313	1,232,133	2,436,726
Refrigerators & Refrigerator/Freezers (Compression Type)	691,892 *				
Under 6.5 cu. ft.		425,685	324,407	429,975	539,426
6.5 cu. ft. & over but under 9.5 cu. ft.		101,799	151,883	61,851	59,223
9.5 cu. ft. & over but under 13.5 cu. ft.		95,507	80,804	113,593	175,966
13 cu. ft. & over		1,780	3,520	2,373	10,185
Total	691,892	624,771	560,614	607,792	784,800
Room Air Conditioners (Window or Wall Types)	132,498 **	35,558	27,906	32,376	98,045
Freezers	NA	42,977	38,123	87,954	80,316
Clothes Washers (Automatic & Nonautomatic)	30,966	51,350	34,449	20,611	40,086
Clothes Dryers	NA	3,131	2,447	4,334	5,837
Total U.S Imports	**855,356**	**1,622,383**	**1,840,852**	**1,985,200**	**3,445,810**

*661.3525 Refrigerator and Freezer Equipment, Compression Type
**661.2020 Air Conditioners

NA-not available

Source: Department of Commerce, Report IM146

Factory Shipments — Historical. Table 11 includes the following data for each product: the first year of recorded shipments, total shipments in each decade, and the record shipment year. (Additional historical factory shipment data including annual and monthly totals are available from AHAM.)

Table 11. Historical Perspective
Factory Unit Shipments of Major Home Appliances—Domestic and Export (000 omitted)

Product	1st Year of Recorded Shipments		1920-1929	1930-1939	1940-1949	1950-1959	1960-1969	1970-1979	Record Year	
	Year	Units							Year	Units
Electric Ranges	1930	180	—	2,076	5,621	14,481	19,191	28,436	1973	3,430
Gas Ranges	1930	1,375	—	11,060	15,839	22,156	22,176	20,783	1950	3,031
Microwave Ovens Ranges	1972	314	—	—	—	—	—	11,738	1984	9,132
Automatic Washers	1948	700	—	—	1,558	23,701	34,757	45,586	1973	5,234
Wringer Washers*	1920	600	6,653	11,581	9,531	13,609	5,541	2,333	1950	2,663
Ironers	1933	70	—	—	923	1,646	1,301	—	1948	421
Combination Washer Dryers	1957	179	—	—	—	544	548	—	1959	196
Electric Dryers	1946	2.2	—	—	192	7,051	13,674	26,949	1973	3,330
Gas Dryers	1946	1.65	—	—	53	2,805	6,550	7,943	1972	936
Disposers	1947	100	—	—	430	4,753	12,721	26,731	1984	4,087
Dishwashers	1947	120	—	—	505	3,117	12,279	31,057	1973	3,702
Compactors	1972	202	—	—	—	—	—	2,228	1973	359
Refrigerators	1930	791	—	13,808	20,816	39,247	44,464	56,740	1973	6,774
Freezers	1946	210	—	—	1,992	10,466	11,025	19,064	1974	3,219
Room Air Conditioners	1936	5	—	37	280	11,240	29,265	42,429	1970	5,886
Dehumidifiers	1949	25	—	—	25	1,509	3,376	4,969	1979	685

*Data collection discontinued in 1984.

Factory Shipments — Current and Outlook. 1984 was the all-time record year for the major appliance industry with 39.4 million units shipped. (Figure 2 and Table 12) This record was primarily due to microwave ovens which accounted for 23% of total 1984 shipments. The previous record year was 1973 when 35.8 million units were shipped.

AHAM forecasts a marginal increase in 1985 with shipments of 39.8 million units.* Shipments of most products will be at the 1984 levels. However, additional growth is anticipated for microwave ovens, now found in about four out of 10 households.

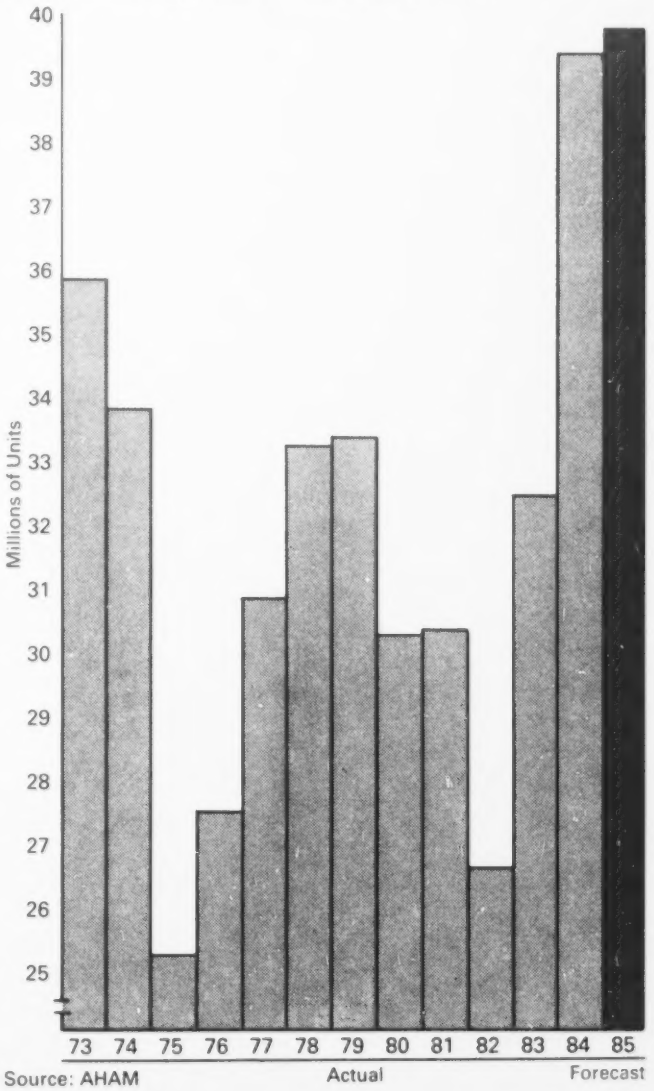
The continued high level of appliance shipments is primarily due to replacement sales. A large inventory of appliances at the consumer level has reached the normal replacement age. More consumer disposable income and a positive consumer outlook also point to another strong year for the industry.

*This forecast was current as of January 1985. AHAM issues quarterly forecasts. For the *current* forecast, contact AHAM's marketing department.

Other promising indicators for the industry include:

- several product categories with market saturation of less than 50% — freezers, dishwashers, microwave ovens and trash compactors;
- a variety of new lifestyles which demand added conveniences and time-saving features in managing the home;
- the increased buying power of dual-income families;
- establishment of new households by the young adults of the "baby boom" generation; and
- new appliance conveniences, innovative features and increased energy efficiency which stimulate earlier replacement.

Figure 2. Trends and Forecasts Total Major Home Appliance Factory Shipments



Source: AHAM

Appliance Distribution

Business Relationships. Major home appliance manufacturers typically use the "two-step" method of distribution in marketing their products — first, from manufacturer to wholesale distributor and, second, from the wholesale distributor to the retailer or the builder/developer.

There are exceptions to this "two-step" method. Manufacturers may sell directly to retail dealers, builders/developers or buying groups, completely bypassing wholesalers. Private brand retailers buy directly from manufacturers. Mass merchandisers, who usually buy directly from manufacturers, sometimes receive sales and merchandising support at the local level from the wholesale distributors of manufacturers whose lines they handle.

Physical Distribution of Appliances. Inventories of finished products are generally maintained at factory warehouses, regional warehouses under the manufacturer's direct control, and at the wholesale distributor level. Private brand retailers and mass merchandisers maintain inventory at points strategically located to serve their retail outlets.

Manufacturers ship products from the factory in a variety of ways:

- to a regional warehouse, then to a wholesale distributor and then to a retailer or builder/developer;
- to the retailer;
- to a wholesale distributor and then to a retailer; or
- to a regional warehouse and then to a retailer.

Figure 3 is a flow chart depicting the various combinations that may be used in the physical distribution of appliances.

Wholesale Distributors. Wholesale distributors are either independent, privately-owned or manufacturer-owned. Some manufacturers use independent wholesale distributors exclusively; some own all of their wholesale operations; and others use a combination of the two. In 1977 there were 2,577 wholesale distributors of electric appliances and televisions/radios in the United States.

In order to offer their customers a complete array of major appliances, independent distributors may handle the products of more than one manufacturer. For instance, a distributor may offer dishwashers manufactured by one company and ranges produced by another company. However, it is rare for a distributor to handle competing lines. Additionally, independent distributors frequently handle other types of products such as televisions, radios, stereos, floor coverings and garden and lawn equipment.

Retail Trade. Retailers that sell appliances to the final user are autonomous business organizations, independent of both the appliance manufacturer and the wholesale distributor. In 1977 major appliances were sold through nearly 72,000 such retail outlets which include appliance stores, hardware stores, department stores, auto/home supply stores, building materials dealers and plumbing and heating contractors. (Table 13)

Virtually all retail dealers served through the manufacturer-distributor channel handle several brands of appliances. This fosters competition among manufacturers and distributors.

Table 12. Trends and Forecasts. Factory Unit Shipments of Major Home Appliances* (Domestic & Export)

Product	1975	1976	1977	1978	1979	1980
Cooking—Total	**3,134**	**4,132**	**5,003**	**5,497**	**5,555**	**5,917**
Electric Ranges—Total	2,082	2,463	3,011	3,217	3,000	2,530
Free Standing	1,568	1,762	2,194	2,336	2,244	1,975
Built-In	514	701	817	881	756	555
Microwave Ovens/Ranges	1,052	1,749	2,157	2,501	2,807	3,608
Home Laundry—Total	**7,098**	**7,665**	**8,486**	**8,659**	**8,516**	**7,727**
Washers—Total	4,228	4,492	4,933	5,038	4,965	4,550
Automatic	4,032	4,288	4,739	4,838	4,779	4,426
Wringer & Other	196	205	194	200	186	124
Dryers—Total	2,870	3,173	3,553	3,621	3,551	3,177
Electric	2,198	2,466	2,817	2,865	2,783	2,494
Gas	672	708	736	757	768	682
Kitchen Clean Up—Total	**5,015**	**5,905**	**6,574**	**7,169**	**7,098**	**5,935**
Disposers	2,080	2,516	2,941	3,312	3,317	2,962
Dishwashers—Total	2,702	3,140	3,356	3,557	3,488	2,738
Built-In	1,947	2,337	2,705	2,971	2,984	2,354
Portable	755	803	651	586	504	384
Compactors	233	249	277	300	293	235
Food Preservation—Total	**7,034**	**6,358**	**7,305**	**7,411**	**7,642**	**6,875**
Refrigerators	4,577	4,817	5,707	5,890	5,701	5,124
Freezers—Total	2,457	1,541	1,598	1,521	1,941	1,751
Chest	1,076	710	746	686	902	789
Upright	1,381	832	852	835	1,039	963
Home Comfort—Total	**3,062**	**3,405**	**3,589**	**4,479**	**4,434**	**3,876**
Room Air Conditioners	2,670	2,961	3,270	4,037	3,749	3,203
Dehumidifiers	392	444	319	442	685	673
All Major Appliances	**25,344**	**27,466**	**30,957**	**33,215**	**33,244**	**30,330**
Gas Ranges #	1,618	1,824	1,746	1,794	1,799	1,539

1981	1982	1983	1984	1985**
6,509	**5,935**	**8,478**	**11,985**	**12,398**
2,328	2,036	2,754	3,074	3,093
1,829	1,619	2,190	2,496	2,493
498	417	563	577	600
4,422	4,071	5,933	9,132	9,545
7,342	**6,746**	**7,910**	**8,733**	**8,725**
4,365	4,019	4,616	5,049	5,056
4,277	3,955	4,546	5,049	5,056
88	64	69	NA	NA
2,977	2,727	3,294	3,684	3,669
2,337	2,143	2,622	2,931	2,932
640	584	672	754	737
5,854	**5,098**	**6,822**	**7,758**	**7,637**
3,179	2,780	3,544	4,085	4,002
2,484	2,170	3,121	3,491	3,445
2,193	1,956	2,859	3,245	3,221
291	214	262	246	224
191	148	157	182	190
6,549	**5,704**	**6,818**	**7,275**	**7,356**
4,944	4,364	5,477	5,994	6,118
1,605	1,340	1,341	1,281	1,238
717	614	639	631	608
889	726	702	650	630
4,229	**3,201**	**2,439**	**3,694**	**3,687**
3,693	2,761	2,002	3,103	3,127
536	440	437	591	560
30,482	**26,683**	**32,466**	**39,444**	**39,802**
1,496	1,368	1,573	1,732	NA

* 000 Omitted

** Forecasts as of November, 1984

Source: GAMA, not included in cooking total or total shipments

NA—Not Available

Total industry shipments may not add due to rounding and overlapping categories

Figure 3. Major Home Appliance Physical Distribution

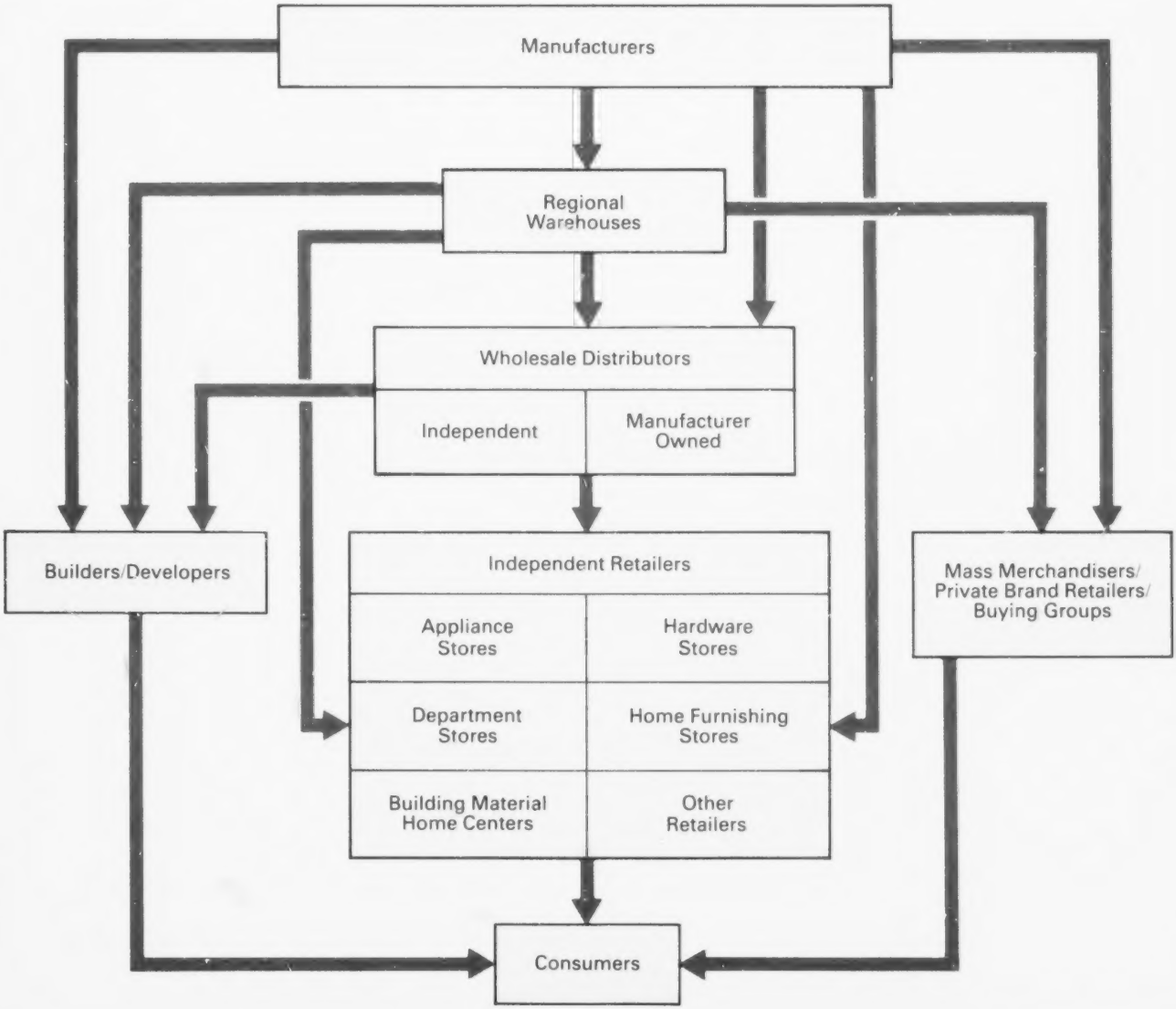


Table 13. Primary Retail Outlets For Major Home Appliances (1977 data)

Outlets	Establishments
Furniture, Home Furnishing, & Equipment Stores	**25,714**
Household Appliance Stores	11,944
Radio, TV, Music Stores	2,554
Miscellaneous Retail Stores	**12,417**
Mail Order Houses	3,695
Direct Selling Establishments	1,927
General Merchandise Group Stores	**10,957**
Department Stores	5,861
Miscellaneous General Merchandise Stores	3,784
Building Materials, Hardware, Garden Supply, & Mobile Home Dealers	**10,133**
Hardware Stores*	6,129
Automotive Dealers	**9,914**
Drug & Proprietary Stores	**1,794**
Food Stores	**756**
All Other Retailers	**281**
Total Retail Trade	**71,966**

*These are subcategories of the primary outlets and are computed in the total figure

Mass Merchandisers and Private Brand Retailers. Mass merchandisers and private brand retailers buy appliances directly from manufacturers and sell them directly to consumers. A *mass merchandiser* (e.g., K-Mart, Zayre) buys and sells products bearing a manufacturer's brand. *Private brand retailers* (e.g., Sears Roebuck & Company, Montgomery Wards) contract with the manufacturer to produce appliances according to their specifications and with their own brand name applied.

Builders/Developers. Home builders and housing development firms sell appliances directly to consumers as part of a new home purchase. (Table 8) These companies purchase appliances either directly from the manufacturer or from a distributor.

The Products— Trends and Innovations

The basic household functions of major home appliances do not change. However, diverse lifestyles, energy availability and cost, new technology and design concepts, and competition within the industry are all forces resulting in more convenient, durable, energy efficient, affordable and versatile home appliances.

Especially noteworthy are achievements in the areas of value, energy efficiency, electronic applications and capacity and size options.

The Major Home Appliance "Value Story"

Major appliance prices have increased less than those of most other commodities due to an intensely competitive industry with a high productivity record.

Producers Price Index (PPI). The PPI measures the average change in prices at the manufacturing level. Table 14 shows that the average change in prices from 1957 through 1983 for all commodities was more than triple, but for major appliances was less than double.

Consumer Price Index (CPI). The CPI reflects the same trend as the PPI, with home appliances showing a smaller average change in price than all items. (Tables 15 and 16) From 1967 to 1983, the price index of household appliances rose 88.4%, compared to 198.4% for all items. Table 17 shows the CPI for all items using a different base year of 1957.

"Hours to Earn." Appliance prices have increased more slowly than the rate of earnings, so consumers can actually "earn" a new major appliance with fewer hours "on the job" today than were required 15 years ago.

Table 18 provides the average retail value of 10 major appliances and the number of hours of work required to "earn" these products, comparing 1968 to 1983. For example, in 1983 a new dishwasher could be "earned" with 37% fewer hours at work than required 15 years earlier.

Additionally, the appliances "earned" today are superior in convenience, time-saving features and energy efficiency compared to the products of 15 years ago.

Appliances and Energy Conservation

Appliance Energy Consumption. The United States Department of Energy (DOE) reports that the total energy consumption in the United States in 1983 was 70.52 quads.* Consumption peaked in 1979 at 78.83 quads. The residential sector consumed 14.88 quads in 1983, 21% of the national total. Residential energy use peaked in 1978 at 15.62 quads. The distribution of 1983 energy consumption by end use sector is shown in Figure 4.

*A *quad* is a unit of energy equaling 1×10^{15} BTU's.

Table 19 provides a detailed breakdown of the energy used in the residential sector (American households) by specific products, both as percentages of total national energy use and as percentages of an average household's energy use.

The residential sector uses about 15 quads of energy annually. Figure 5 shows the amount of energy used in the residential sector for specific products by type of fuel. A total of 8.14 quads of electrical energy is used by appliances; 5.05 quads of natural gas; and 2.68 quads, other fuels.

The average energy usage of specific appliance product types is provided in Table 20. Actual appliance kilowatt/hour consumption can vary significantly from these averages because of variations in product capacity/size, efficiency level, frequency of use or climatic conditions.

Due to the considerable variance in clothes washer and dryer and dishwasher usage, kWh consumption is expressed in cycles rather than annual usage. Average annual usage is 416 cycles for clothes washers and dryers and 322 cycles for dishwashers.

Appliance Energy Efficiency Improvements. Appliance energy efficiency has been a major focus in the industry since the early Seventies. As energy costs have increased, so has the demand for more energy efficient appliances. The average cost of electricity in 1972 was 3.8 cents/kWh; the average cost of natural gas, 19.4 cents/Therm. By 1984, electricity cost had jumped 104% to 7.75 cents/kWh and natural gas costs, 218% to 61.7 cents/Therm.

The industry, through AHAM, began collecting energy data on major home appliances in 1972. Thus, 1972 is the base year for all energy improvement comparisons.

Appliance energy efficiency is expressed by an Energy Factor (EF). Energy Factors are calculated differently for the various product types. All AHAM energy data are based on measurements in accordance with DOE test procedures.

Energy efficiency measurements are average values weighted by the shipments of each model — that is, weighted to reflect the mix of models within each product category actually shipped in the market. For example, assume there are two models in the same product group and Model A has a 60% efficiency improvement and Model B, a 30%. If each model is given equal weight in calculating the average efficiency of this product group, the average is 45%. If the data are weighted to reflect the actual number of shipments of each model, and shipments of Model A predominate, the shipment weighted average will be greater than 45%. On the other hand, if shipments of Model B predominate, the weighted average improvements will be less than 45%.

Efficiency improvements achieved vary by product category. Opportunities for efficiency gains depend on the way the product operates, design limitations or current technology. Efficiency gains are leveling off for some products; additional gains depend on major technological breakthroughs.

Figure 6 shows the energy efficiency gains made since 1972 in the five major appliance categories for which data has been collected. These gains translate into energy use reductions. Figure 7 provides the reductions in kilowatt hours used by these same five product groups.

Table 14. Producer Price Index* Annual Average (1957-59 = 100)

Year	#All Commodities	Furniture & Household Durables	Major Appliances	Cooking Ranges	Laundry Equipment
1957	99.1	99.4	**100.8**	98.8	100.2
1958	100.4	100.2	**99.9**	100.2	100.1
1959	100.6	100.4	**99.3**	101.0	99.6
1960	100.7	100.1	**96.0**	100.0	98.1
1961	100.3	99.5	**93.5**	99.6	97.1
1962	100.6	98.8	**92.0**	99.9	95.6
1963	100.3	98.1	**90.3**	100.4	94.5
1964	100.5	98.5	**89.7**	101.1	94.3
1965	102.5	98.0	**87.9**	100.6	92.2
1966	105.9	99.1	**87.8**	101.0	92.2
1967	106.1	101.1	**88.9**	102.9	93.4
1968	108.7	104.0	**90.8**	104.5	95.6
1969	113.0	106.1	**92.0**	105.9	97.1
1970	117.1	108.7	**94.5**	110.7	99.1
1971	120.9	111.1	**96.3**	114.7	100.0
1972	126.4	112.6	**96.3**	116.4	100.5
1973	143.8	116.5	**96.8**	119.5	101.2
1974	169.9	129.3	**104.7**	129.4	110.5
1975	185.6	141.2	**118.9**	146.1	124.6
1976	194.1	147.1	**126.0**	154.2	135.2
1977	206.0	153.0	**131.4**	163.6	140.3
1978	222.1	162.2	**137.7**	171.2	146.9
1979	250.0	173.2	**144.4**	181.1	155.2
1980	285.2	189.8	**155.7**	197.4	167.7
1981	311.3	200.7	**167.8**	209.4	180.1
1982	317.6	209.2	**180.1**	222.4	192.6
1983	321.6	216.4	**187.8**	232.8	199.3

Refrigeration Equipment	Undercounter Dishwashers	Food Waste Disposers
102.3	NA	NA
99.6	NA	NA
98.1	NA	NA
91.6	NA	NA
86.8	NA	NA
84.7	NA	NA
81.6	NA	NA
79.9	NA	NA
78.0	NA	NA
77.6	NA	NA
78.4	100.7	100.0
80.8	98.4	98.8
82.1	100.0	100.7
83.5	100.9	103.5
84.9	104.2	102.3
83.8	102.7	105.3
83.3	104.7	103.2
89.5	110.6	108.6
102.6	125.0	122.9
107.6	129.7	128.9
111.7	136.3	132.5
117.1	142.4	143.5
121.4	150.4	151.4
129.8	163.6	165.7
141.6	175.1	182.4
153.7	188.0	195.8
159.5	193.8	NA

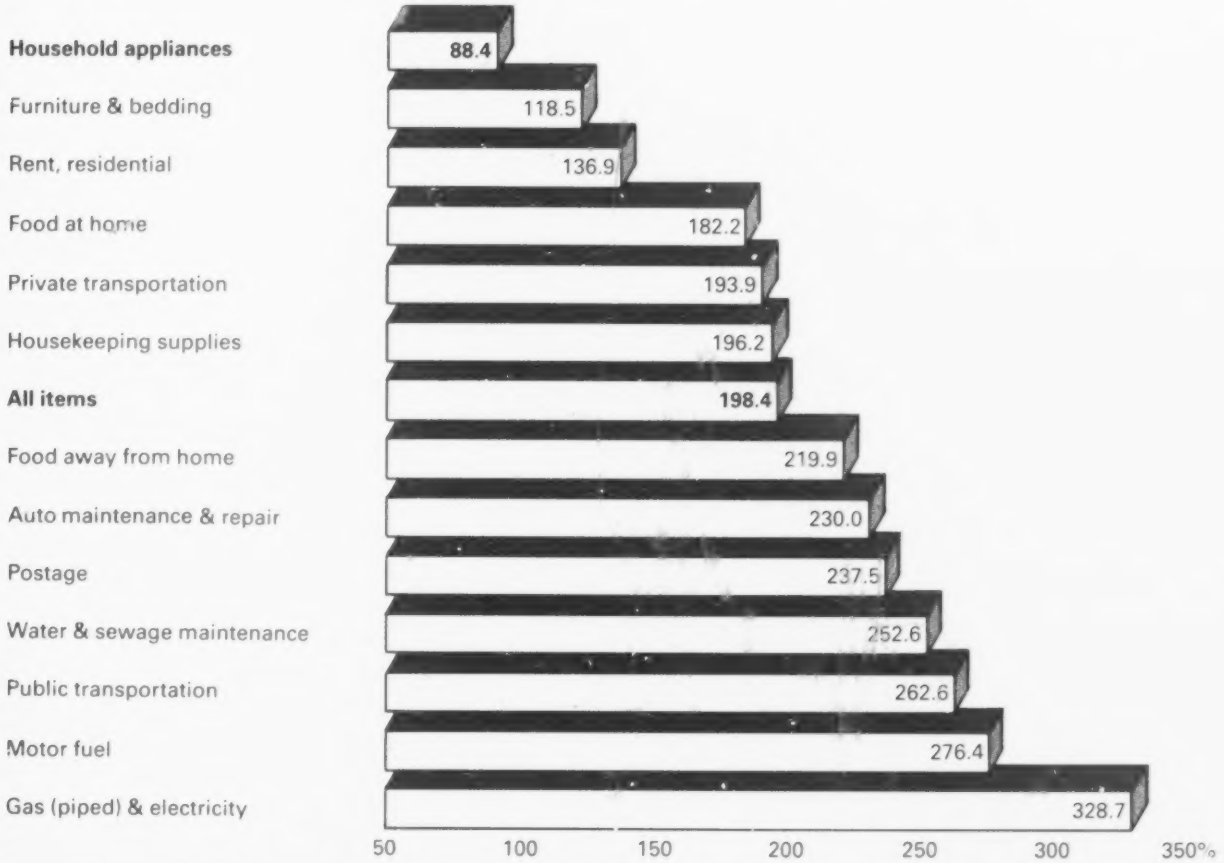
Comprised of over 2800 items.

* Prior to March 1978, known as the Wholesale Price Index.

NA — not available.

Source: United States Department of Labor, Bureau of Labor Statistics.

Table 15. Percentage Increases In the Consumer Price Index* (1983 Averages Compared to 1967)



*Based on 1983 annual average Consumer Price Index for all urban consumers.

The "Percentage Increase in the Consumer Price Index" table compares the rate of price increases from 1967 through 1983 for appliances and other expenditures. The percentage increases are based on the 1983 annual average CPI for all urban consumers.

Table 16. Consumer Price Indexes (1967 Base = 100, Unless Otherwise Specified) Annual Average All Urban Consumers

Year	1978	1979	1980	1981	1982	1983
# All Items	195.4	217.4	246.8	272.4	289.1	298.4
## Household Appliances	147.3	155.4	163.1	172.6	183.1	188.4
Refrigerators & Freezers	146.2	153.2	162.4	173.5	187.3	193.3
Laundry Equipment*	103.5	110.3	119.0	127.6	136.8	143.0
Stoves, Dishwashers, Vacuum Cleaners, Sewing Machines*	104.7	109.2	111.3	117.3	122.2	124.3

Compromised of approximately 400 items.

Includes refrigerators and home freezers, laundry equipment, stoves, dishwashers, vacuum cleaners, sewing machines, office machines, small electric appliances, air conditioners, and heaters.

*December, 1977 = 100

Source: U.S. Department of Labor, Bureau of Labor Statistics.

Table 17. Consumer Price Indexes (1957-59 = 100)

Annual Average	#All Items	##Appliances	Automatic Washers	Refrigerators	Free Standing Ranges
1957	98.0	101.1	101.4	102.4	100.5
1958	100.7	99.4	100.3	98.9	99.7
1959	101.5	99.5	98.4	98.6	99.9
1960	103.1	98.8	95.9	96.6	98.8
1961	104.2	96.5	93.0	95.3	96.8
1962	105.4	93.5	90.5	93.0	96.4
1963	106.7	91.5	89.2	90.6	95.7
1964	108.1	90.0	88.0	88.8	95.0
1965	109.9	87.1	86.8	86.2	93.7
1966	113.1	84.4	86.3	82.9	92.0
1967	116.3	83.8	86.6	82.7	92.7
1968	121.2	88.7	88.8	83.8	95.2
1969	127.7	90.6	90.6	85.3	97.7
1970	135.3	92.9	92.9	87.5	100.6
1971	141.0	94.8	94.7	89.4	102.9
1972	145.7	95.3	95.7	89.4	102.8
1973	154.7	95.4	96.1	89.6	102.3
1974	171.8	100.5	101.4	94.8	107.4
1975	187.5	111.3	114.2	106.4	120.5
1976	198.3	117.6	122.1	111.5	128.6
1977	211.1	121.8	126.0	115.5	132.9
June 1978	226.9	126.4	130.5	120.8	135.6

**Electric Clothes Dryers	***Air Conditioners	**Garbage Disposal Units
—		
99.7		99.3
97.3	92.7*	98.7
94.5	92.6*	98.7
94.5	94.7*	98.8
97.4	96.9*	100.9
99.4	99.5*	103.9
102.4	101.5*	107.8
106.2	104.4*	108.8
107.9	104.9*	109.7
108.1	104.3*	110.6
114.7	107.5*	116.5
129.2	117.4*	129.1
140.4	122.8*	132.7
146.6	128.1*	137.6
150.6	137.0	142.5

Comprised of approximately 400 Items

Also includes canister type vacuum cleaners. Radios and television sets are included through 1967 but excluded thereafter.

* Priced in season only — represents seasonal average

** December, 1963 = 100

*** June, 1964 = 100

Source: United States Department of Labor, Bureau of Labor Statistics

Table 18. "Hours to Earn" Major Home Appliances

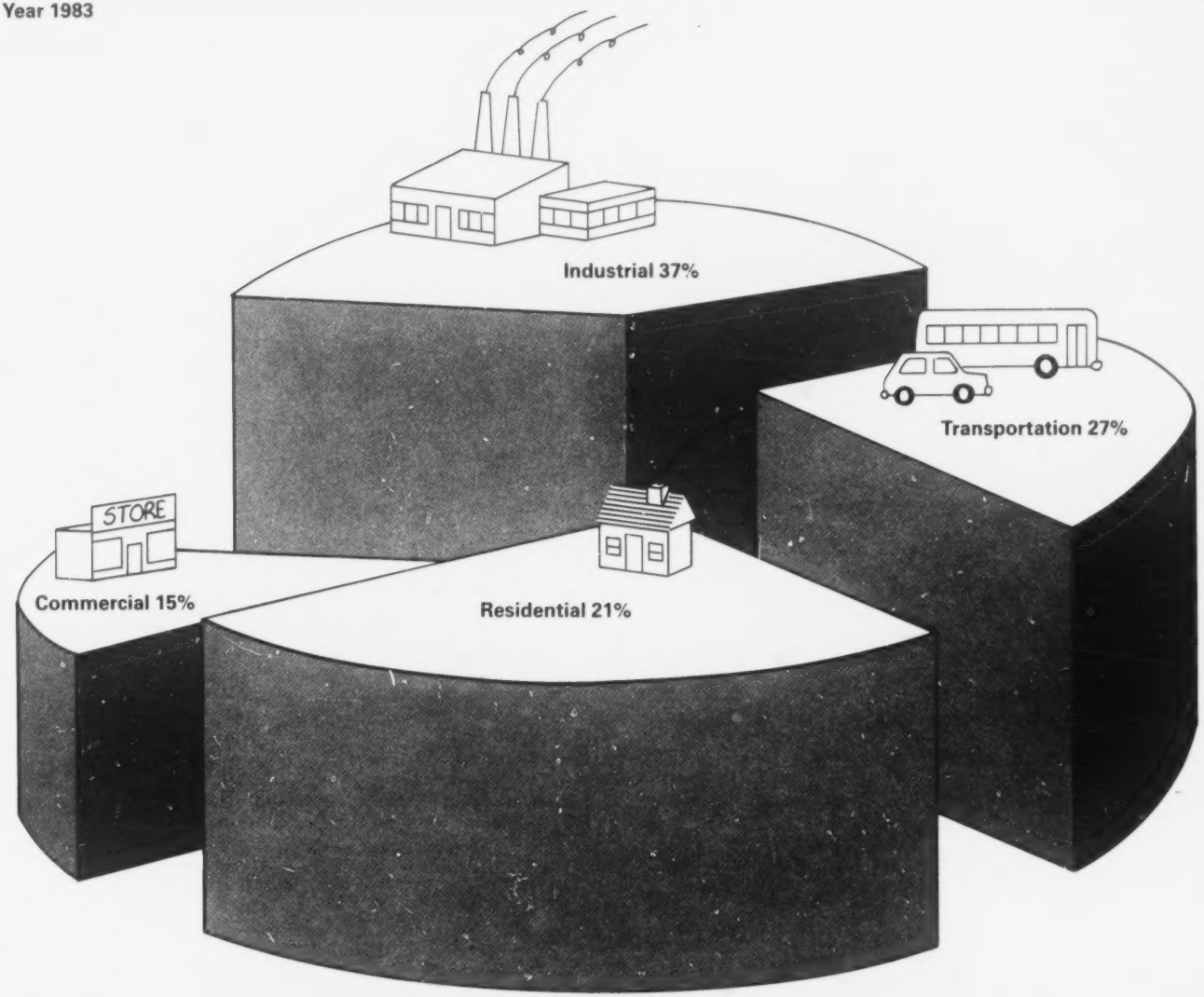
	1968		1983		
	Average Retail Value*	Hours to Earn**	Average Retail Value*	Hours to Earn**	Percent Decrease in Hours to Earn
Room Air Conditioners	$210	69.8	$440	51.6	- 26.1
Dehumidifiers	80	26.6	182	21.3	- 19.9
Dishwashers	221	73.4	395	46.3	- 36.9
Disposers	60	19.9	112	13.1	- 34.2
Freezers	233	77.4	487	57.1	- 26.2
Elec. Ranges	230	76.4	458	53.7	- 29.7
Refrigerators	280	93.0	686	80.4	- 13.5
Automatic Washers	248	82.4	450	52.8	- 35.9
Electric Dryers	175	58.1	349	40.9	- 29.6
Gas Dryers	197	65.4	375	44.0	- 32.7

*Based on *Merchandising Magazine* Annual Statistical Reports for 1968 and 1983.

**Based on U.S. Department of Labor, Bureau of Labor Statistics Data: Average hourly earnings of Production Workers, Private Manufacturing in 1968 was $3.01 and in 1983 was $8.53.

Figure 4. Total United States Energy Consumption by End-Use Sector

Year 1983



Source: Energy Conservation Indicators 1983 Annual Report, DOE/EIA -0441 (83), pp. 71-73.

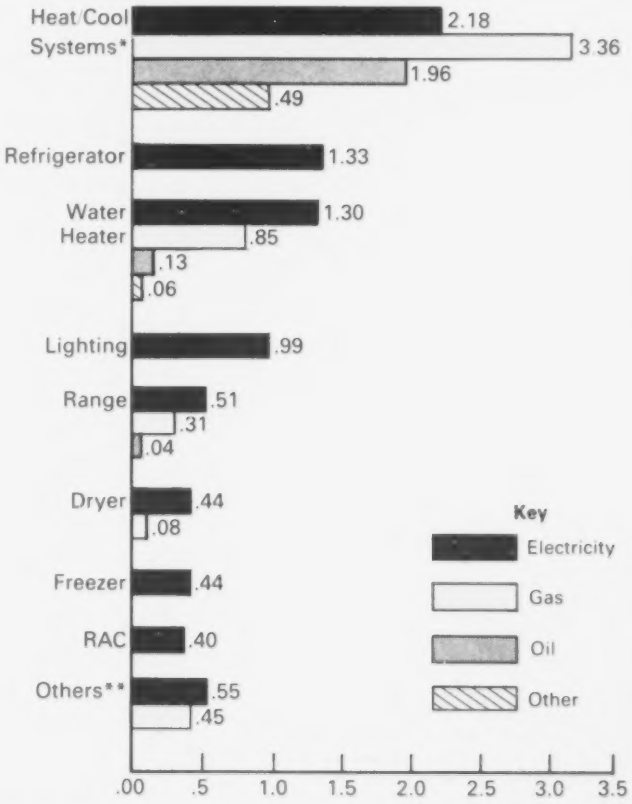
Table 19. Residential Energy Consumption by End-Use (1980)

Product	Percent of Total Residential	U.S.
Central Space Heater	34.4%	7.2%
Water Heater	14.7	3.1
Room Space Heater	11.5	2.4
Refrigerator	8.4	1.7
Lighting	6.2	1.3
Range	5.4	1.1
Central Air Conditioning	4.0	.8
Dryer	3.3	.7
Freezer	2.8	.6
Room Air Conditioner	2.5	.5
Heat Pump	.4	.1
Others*	6.3	1.3
Total	**100%**	**20.9%**

*Includes washers, dishwashers, disposers, television, radio, portable appliances, etc.

Source: Supplement to March 1982 Consumer Products Efficiency Standards Engineering and Economic Analysis, DOE/CE-0045, page 57.

Figure 5. Residential Products Energy Use (In Quads and by Fuel Type) 1980



*Includes: central space heating, room space heater, central air conditioner and heat pump

**Includes: washers, dishwashers, disposers, television, radio, portable appliances, etc.

Source: Supplement to March 1982 Consumer Products Efficiency Standards Engineering and Economic Analysis, DOE/CE 0045, page 57.

Table 20. Major Home Appliances
Average Energy Use

Product	Average Energy Use/Unit
Refrigerators	1160 kWh/Year*
Freezers	813 kWh/Year*
Room Air Conditioners	1088 kWh/Year*/**
Electric Ovens	373 kWh/Year
Electric Cooktops	365 kWh/Year
Microwave Ovens	98 kWh/Year
Dishwashers	2.70 kWh/Cycle*
Automatic Washers	2.57 kWh/Cycle*
Electric Dryers	2.51 kWh/Cycle
Gas Dryers	9.908 Btu/Cycle

*Shipment Weighted Averages for 1983 products; others are for 1980 products.

**Based on 750 hours of operation a year.

Source: AHAM

Figure 6. Major Appliances
Percent of Efficiency Improvements 1972-1983

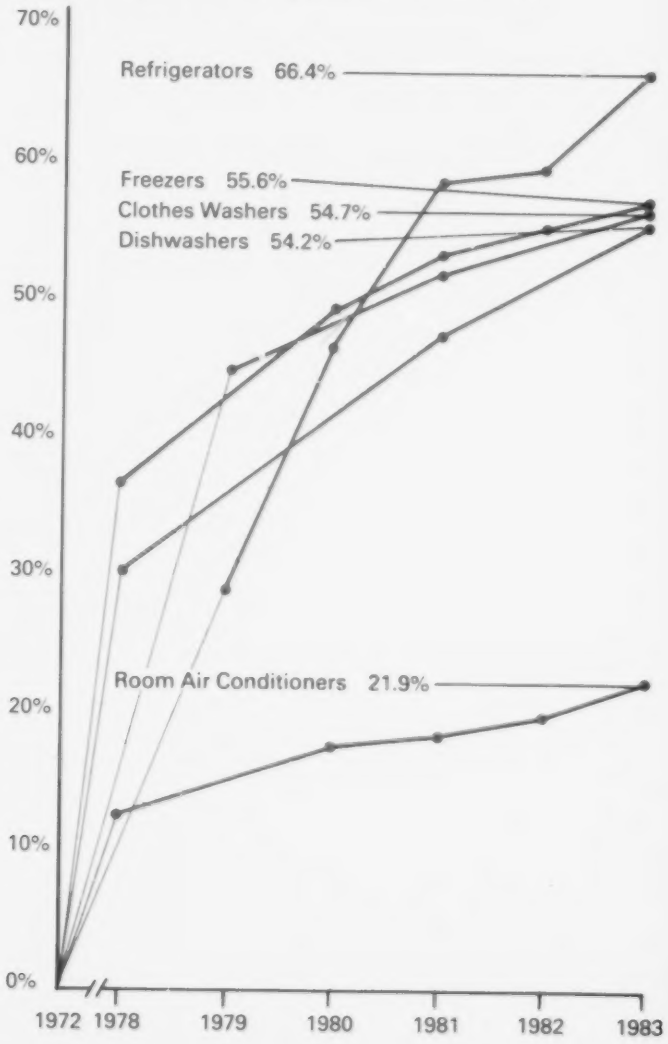
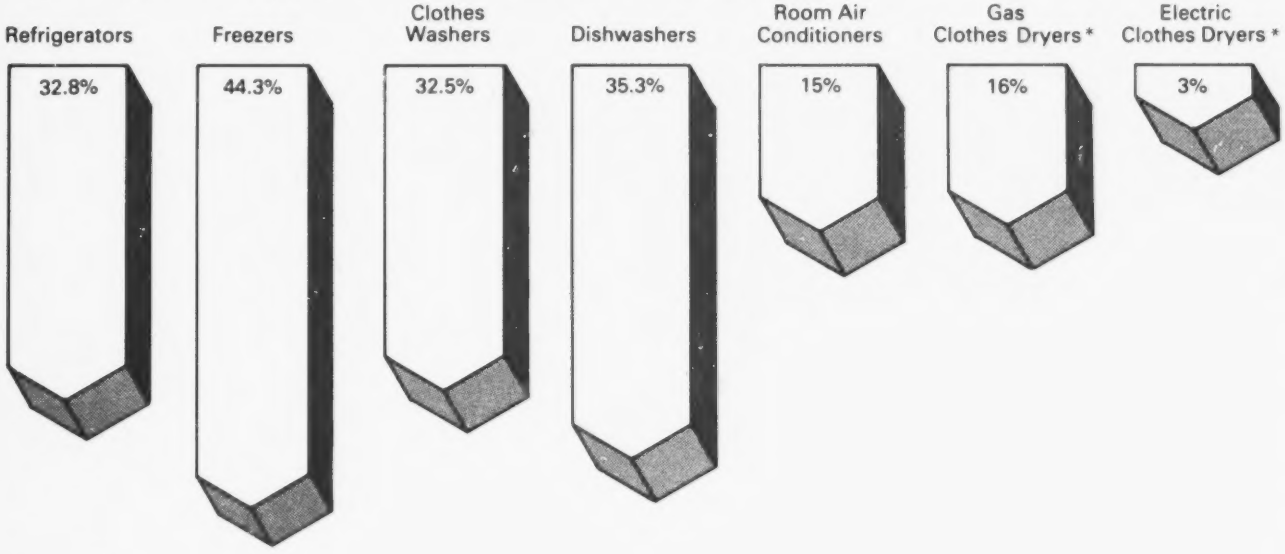


Figure 7. Major Home Appliance Energy Use Reductions (1972-1983)



*1980 Data

Table 21. Refrigerators. Energy Efficiency and Consumption Trends

	Adjusted Volume/Unit*/**		Energy Consumption/Unit*		Efficiency*	
	Cu. Ft.	Percent Change vs. 1972	kWh/Yr	Percent Change vs. 1972	Energy Factor	Percent Change vs. 1972
1972	18.16	—	1726.45	—	3.84	—
1978	19.73	+ 8.6%	1452.70	− 15.9%	4.96	+ 29.0%
1980	19.60	+ 7.9%	1277.50	− 26.0%	5.59	+ 45.6%
1981	19.86	+ 9.4%	1189.54	− 31.1%	6.09	+ 58.6%
1982	19.97	+ 10.0%	1190.70	− 31.0%	6.12	+ 59.4%
1983	20.31	+ 11.8%	1160.21	− 32.8%	6.39	+ 66.4%

*Shipment Weighted Averages

**The adjusted volume given for refrigerators and freezers compensates for the additional energy used to maintain the lower operating temperatures in freezer compartments and is in accordance with current Federal test procedures.

Source: AHAM

Refrigerators and Freezers. Improved condensers, evaporators, fan motors, door seals and use of foam insulation have produced most of the efficiency gains for refrigerators and freezers. Such features as anti-sweat heater switches, electronic monitoring systems and the "door within a door" also reduce energy consumption. Tables 21 and 22 provide the efficiency gains for these appliances since 1972. The 66.4% efficiency improvement for refrigerators and the 55.8% improvement for freezers was achieved without reducing capacity.

Table 22. Freezers. Energy Efficiency and Consumption Trends

	Adjusted Volume/Unit*/**		Energy Consumption/Unit*		Efficiency*	
	Cu. Ft.	Percent Change vs. 1972	kWh/Yr.	Percent Change vs. 1972	Energy Factor	Percent Change vs. 1972
1972	29.18	—	1460.00	—	7.29	—
1978	26.84	− 8.0%	985.50	− 32.5%	9.92	+ 36.1%
1980	26.26	− 10.0%	883.30	− 39.5%	10.85	+ 48.8%
1981	25.53	− 12.5%	837.14	− 42.7%	11.13	+ 52.7%
1982	25.11	− 13.9%	812.85	− 44.3%	11.28	+ 54.7%
1983	25.32	− 13.2%	813.33	− 44.3%	11.36	+ 55.8%

*Shipment Weighted Averages

**The adjusted volume given for refrigerators and freezers compensates for the additional energy used to maintain the lower operating temperatures in freezer compartments and is in accordance with current Federal test procedures.

Source: AHAM

Dishwashers. The 54.2% efficiency gain for dishwashers is largely due to improved spray arms and filtering systems which provide better water movement and wash action, resulting in less hot water usage. The "air dry" cycle which bypasses the electrical drying of dishes also saves energy. (Table 23)

Clothes Washers and Dryers. More cold water rinse options, less hot and more cold water in the warm setting mix and better mixing valves have contributed to the 54.7% efficiency gain for clothes washers. (Table 24) While clothes dryers offer little opportunity to improve efficiency, automatic terminator controls eliminate the human error of overdrying and electric ignition systems on all gas dryers eliminate the energy-wasting standing pilot. Also, more effective water extraction in the washer shortens drying time.

Table 23. Dishwashers. Energy Efficiency and Consumption Trends

	Energy Consumption/Unit*		Efficiency*	
	kWh/Cycle	Percent Change vs. 1972	Energy Factor	Percent Change vs. 1972
1972	4.17	—	.24	—
1979	3.23	−22.5%	.31	+29.2%
1981	2.87	−31.2%	.35	+45.8%
1983	2.70	−35.3%	.37	+54.2%

*Shipment Weighted Averages

Source: AHAM

Table 24. Automatic Clothes Washers. Energy Efficiency and Consumption Trends

	Tub Volume/Unit*		Energy Consumption/Unit*		Efficiency*	
	Cu. Ft.	Percent Change vs. 1972	kWh/Cycle	Percent Change vs. 1972	Energy Factor	Percent Change vs. 1972
1972	2.44	—	3.81	—	.64	—
1979	2.56	+4.9%	2.80	−26.5%	.91	+42.2%
1981	2.52	+3.3%	2.59	−32.0%	.97	+51.6%
1983	2.54	+4.1%	2.57	−32.5%	.99	+54.7%

*Shipment Weighted Averages

Due to the considerable variance in clothes washer usage, kWh consumption is provided in cycles rather than total annual usage.

Source: AHAM

Room Air Conditioners. Improved filtering systems, new coil designs, more efficient compressors and better air circulation systems have contributed to the 21.9% gain in efficiency. Some units also have timers that automatically start and stop the unit. (Table 25)

A room air conditioner Energy Efficiency Rating (EER) is determined by dividing BTU/hr (cooling capacity) by the watts of power used. The higher the EER, the more energy efficient the air conditioner. Table 26 shows the increasing popularity of high efficiency models. Models with 7.5 EER and higher now represent 55% of all room air conditioner sales.

Table 25. Room Air Conditioners. Energy Efficiency and Consumption Trends

	Capacity/Unit*		Energy Consumption/Unit*		Efficiency*	
	Btu/Hr	Percent Change vs. 1972	kWh/Yr **	Percent Change vs. 1972	E.E.R.	Percent Change vs. 1972
1972	10,226.8	—	1,281.8	—	5.98	—
1978	10,827.6	+ 5.9%	1,209.2	– 5.7%	6.72	+ 12.2%
1980	10,606.6	+ 3.7%	1,134.2	– 11.5%	7.02	+ 17.3%
1981	10,924.4	+ 6.8%	1,161.1	– 9.4%	7.06	+ 18.1%
1982	10,801.4	+ 5.6%	1,135.0	– 11.5%	7.14	+ 19.4%
1983	10,566.3	+ 3.3%	1,087.8	– 15.1%	7.29	+ 21.9%

*Shipment Weighted Averages

**@ 750 Hours of Operation

Source: AHAM

Table 26. Room Air Conditioner Shipments by Energy Efficiency (EER) Classification

Energy Efficiency Rating	Percent of Domestic Unit Shipments							Percent Change in Share of Total 1984 vs. 1974
	1974	1978	1980	1981	1982	1983	1984	
Under 6.5	52.3	41.8	36.9	34.3	30.8	28.7	25.0	– 52.2
6.5-7.4	27.8	28.6	20.6	19.5	19.4	20.7	20.0	– 28.1
7.5-8.4	9.2	18.0	31.1	29.8	31.2	28.2	27.3	+ 196.7
8.5 & Over	10.7	11.6	11.4	16.4	18.6	22.4	27.7	+ 158.9
TOTAL	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**	

Source: AHAM

Ranges and Ovens. Adjustable coil sizes of surface units, additional oven insulation and tighter fitting oven door gaskets and hinges all contribute to the energy efficiency of ranges and ovens. Over half of all gas ranges now have electric ignition systems to eliminate the standing pilot. AHAM has not collected data on ranges and ovens due to the minimal opportunities to reduce the energy consumption that exist for these already efficient products. (For more energy data, order the energy-related AHAM publications listed on page 45.)

Appliance Capacities/Sizes

The variety of appliance capacities currently offered reflect the diverse lifestyles and needs of today's consumers. Wherever possible, manufacturers are increasing capacity without adding to the exterior dimensions of the product — an important consideration since appliances must fit into existing spaces in homes.

Table 27 shows that, with the exception of the refrigerator, consumer capacity preferences have changed little since 1972.

However, "bigger" does not necessarily mean "better" nor does "smaller" always mean "cheaper." More smaller capacity appliances now have convenience features traditionally found only in the larger, top-of-the-line models. Another growing trend is to install compact appliances in areas where appliances have not been traditionally used — college dorms, family rooms, even bedrooms. Different installation options are also emerging such as microwave ovens mounted under the cabinet and dishwashers placed under the sink. All of these innovations respond either to consumers who want certain appliances but have limited space or to the special needs of the one- and two-person households who require smaller appliances but also want — and can afford — added conveniences.

Table 27. Consumer Major Home Appliance Capacity Preferences

	1972	1983
Refrigerator		
Most popular capacity	12 cubic feet	17 cubic feet
2nd most popular capacity	14 cubic feet	14 cubic feet
Freezer		
Most popular capacity	15 cubic feet	16 cubic feet
2nd most popular capacity	16 cubic feet	15 cubic feet
Room Air Conditioner		
Most popular capacity	Under 6,000 Btu	Under 6,000 Btu

Appliance Colors

White is the traditional major appliance color — hence, the general reference to major kitchen and laundry appliances as "white goods." (In contrast, entertainment products such as radios, televisions, and stereos are often referred to as "brown goods," relating to their wood-tone cabinetry.)

Pastels such as pink, yellow, turquoise and fawn were introduced on appliances in the Fifties. These colors phased out in the Sixties with the emergence of avocado, coppertone and harvest gold which also appeared with shaded edges. The contemporary look of black glass became popular in the Seventies for appliance doors, especially on conventional and microwave ovens, dishwashers, trash compactors and in panel kits for refrigerator fronts. A new color — almond — was introduced next, followed in the early Eighties by two neutral hues — gray and light tan. The current trend is to blend appliances into the room using interchangeable panels or decorator door fronts, built-ins or wood-look doors and panel fronts.

The percentage of factory shipments attributed to specific colors indicate consumer appliance color preferences. Table 28 shows that almond remains the most popular color for kitchen appliances while white is the first choice for home laundry equipment and freezers.

Table 28. Percent of Major Home Appliance Shipments by Color

Laundry Equipment

	1982	1983 Estimate
Almond	26%	28%
Avocado	1%	1%
Coffee	1%	0%
Harvest gold	3%	3%
Wheat	5%	3%
White	64%	65%

Dishwashers

	1982	1983 Estimate
Almond	18%	17%
Avocado	1%	1%
Coffee	1%	1%
Coppertone	1%	1%
Harvest gold	2%	1%
Wheat	3%	2%
White	9%	8%
Wood grain	1%	1%
Multicolor panel packages	60%	65%
Other	4%	3%

Trash Compactors

	1982	1983 Estimate
Almond	41%	43%
Avocado	3%	1%
Coffee	4%	3%
Coppertone	2%	1%
Harvest gold	5%	5%
Wheat	10%	10%
White	32%	33%
Wood grain	1%	1%
Other	2%	3%

Ranges

	1982	1983 Estimate
Almond	44%	45%
Avocado	2%	2%
Coffee	2%	2%
Coppertone	1%	0%
Harvest gold	5%	5%
Wheat	9%	8%
White	35%	37%
Black glass and other	2%	1%

	Refrigerators		Freezers	
	1982	1983 Estimate	1982	1983 Estimate
Almond	42%	45%	10%	11%
Avocado	3%	2%	1%	1%
Coffee	2%	2%	1%	1%
Harvest gold	1%	1%	1%	1%
Wheat	15%	13%	1%	1%
White	36%	36%	81%	82%
Woodgrain	1%	1%	5%	3%

Source: *Merchandising,* November 1983.

Electronic Applications

Through electronic technology, today's major appliances perform better, offer more conveniences, last longer and provide easier and faster servicing.

Among today's realities are:

- programming to perform multiple cycles and even correct the user's programming errors;
- visual and audio signals to cue performance, operating conditions or service needs;
- synthetic speech to confirm or instruct program settings;
- a self-diagnosis of malfunctions;
- time delay starts which program the appliance to run at a later hour to avoid peak utility rates;
- "time hold" features to measure the time remaining in a cycle and delay operation for water heating; and
- more precise control of appliance operation, including time and temperature.

The potential for additional applications is great. Design engineers already have, or will have, technology in place for such advancements as:

- appliance connections to the central home computer system, incorporating the television and telephone;
- communication between appliances (e.g., the dishwasher and water heater concerning the amount of hot water needed and when);
- recovering or reducing wasted heat and water through sensors and microcomputers that eliminate user guesswork in appliance settings;
- robots programmed to a house layout that can vacuum the home or transfer clothes from the washer to the dryer; and
- appliance communications to the local service company identifying the malfunction and repairs needed, including parts and tools required for owner's self-service.

Product Milestones

Mid 1850s Gas range developed.

1859 Gas range owned by 100 American families.

1874 Clothes washer with box-like tub and hinged lid and powered by operator built by William Blackstone.

1881 Cooling system developed, consisting of a fan that melted ice at a rate of 436 pounds per hour.

1893 First motor-powered dishwasher introduced at the Chicago World's Fair.

1899 Cooling system developed which dehumidified and cooled the air, at attic level, by pipes filled with cold brine solution.

1908 Electric range introduced.

1908 Electric dishwasher introduced.

1910 "Electrified gas stove" introduced by George Hughes at National Electric Light Association convention.

1914 Electric refrigerator introduced.

1921 Automatic ironer developed.

1922 Air conditioning installed in department stores, theaters and industrial plants.

1924 All white fully enameled electric range introduced.

Monitor-Top Refrigerator, circa 1928

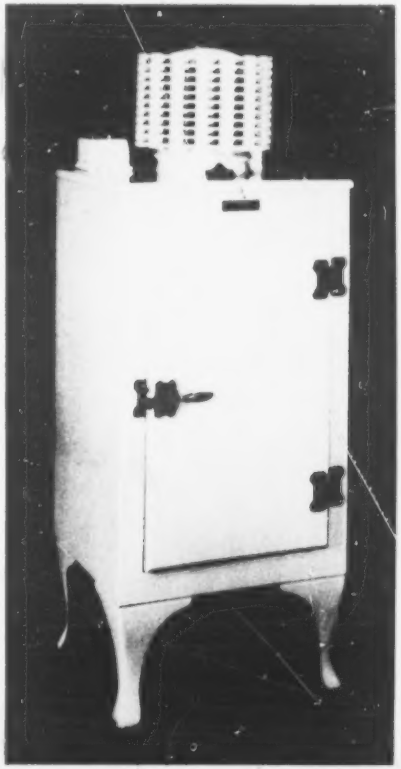
1926 Agitator, spinner-type washer introduced.

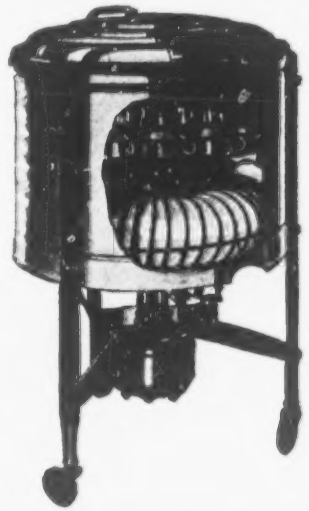
1927 First food waste disposer invented by John Hannes.

1929 Room-size air conditioner units introduced in homes.

1930 Calrod surface units introduced on electric range.

1930 Electric drying device for clothes built by J. Ross Moore.





Dishwasher, circa 1927

1937 Automatic clothes washer introduced.

1940s Microwave energy's effect on food discovered.

1944 Refrigerators owned by 85% of American households.

1947 First successful vertical axis washer developed.

1948 Dehumidifier introduced for home use.

Washing Machine, circa 1940

1952 Automatic ice maker developed.

1952 Mobile dishwasher developed with four-gallon fiber glass water heater tank.

1953 Combination washer/dryer introduced.

1953 Compact (24-inch) clothes washers and dryers introduced.

1954 Appliances in color introduced.

1955 Microwave oven introduced.

1956 Magnetic gaskets introduced for refrigerator and freezer doors.

1957 Permanent (wash and wear) cycles introduced on clothes washers and dryers.

1958 Frost-free refrigerators and freezers introduced.

1958 Automatic ice makers introduced on refrigerators and freezers.

1958 Forced air refrigeration introduced.

1958 Refrigerator condenser coils moved from back to bottom of unit.

1958 Automatic dryness controls introduced on clothes dryers.

1958 Push button programmed cycles introduced on clothes washers.

1958 Automatic bleach and fabric softener dispensers introduced on clothes washers.

Washing Machine, circa 1950

Late 1950s Dual level range introduced.

1960 Foamed-in place insulation introduced in refrigerators.

1960 Semi-conductors incorporated into automatic clothes washers and dryers.

1962 Single thermostat control on room air conditioners introduced.

1963 Pyrolytic, self-cleaning oven developed.

1965 In-door ice water dispenser introduced on refrigerators.

Mid 1960s Counter-top (120V) microwave oven introduced.

1966 Catalytic, continuous-cleaning oven introduced.

1967 First toll-free telephone service offered by appliance manufacturer.

1968 Glass-top cooking surface introduced.

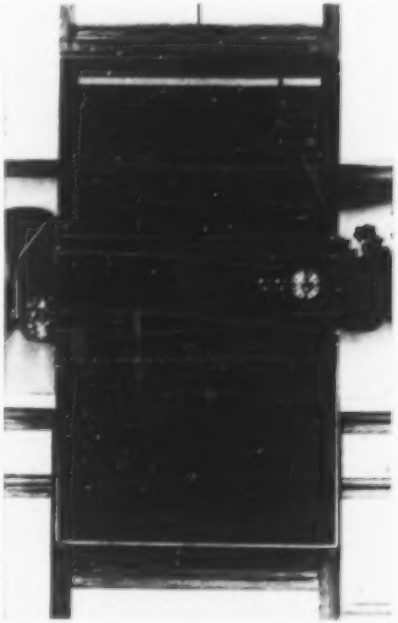
1969 Household trash compactor introduced.

1969 Silverware baskets in the door added to dishwashers.

1977 Solid-state electronic touch-controlled washer introduced.

1978 Magnetic induction cooking surfaces introduced.

Refrigerator, circa 1984



Built-in Microwave Oven, circa 1984

1978 Microelectronics and microcomputers become established trend in home appliances.

1983 Ice cream maker introduced on refrigerator-freezer.

1984 Flash-freeze feature introduced in freezers.

1985 12-lb ice cube maker/storage in refrigerator-freezer.

1985 Computer-measured and controlled refrigerator and freezer temperatures and automatic defrosting.

The Association of Home Appliance Manufacturers (AHAM)

In 1915, 60 clothes washer manufacturers formed the American Washing Machine Manufacturers' Association (AWMMA) to educate consumers on the need for, and use of, the clothes washer.

In the mid-Twenties the manufacturers of clothes washers and other home appliances formed the Consumer Products Section of the National Electrical Manufacturers Association (NEMA).

In 1938, with an increased consumer acceptance of ironers, AWMMA became the American Washer and Ironer Manufacturers' Association.

The organization became the American Home Laundry Manufacturers' Association (AHLMA) in 1954. Under the leadership of its president, Guenther Baumgart, AHLMA's membership grew to include the majority of manufacturers in the laundry equipment industry. The new association formed a statistics department, launched an educational conference and promotional programs and developed standard test methods for measuring appliance performance characteristics.

Then, in 1967, companies with mutual membership in both AHLMA and NEMA's Consumer Products Division merged into a new trade association — AHAM — "to bring together manufacturers with like technical, manufacturing and marketing characteristics and set them apart from other (dissimilar) businesses." (AHAM Prospectus)

AHAM structure includes major appliance and portable appliance divisions. Associate members are manufacturers of materials and parts used in appliances and/or products used by consumers in conjunction with appliances.

The Chicago-headquartered association added a Washington office in 1976 to more closely monitor Federal proposals and represent the views of the appliance industry before regulators and legislators.

AHAM bylaws were amended in 1977 to include international membership.

The Major Appliance Consumer Action Panel (MACAP)

MACAP, established in 1970, is co-sponsored by three national trade associations: AHAM, the Gas Appliance Manufacturers Association (GAMA) and the National Retail Merchants Association (NRMA).

MACAP provides appliance consumers with a clear course to fair and honest handling of major appliance problems that have not been resolved through contacts with the local dealer or service agency or with the appliance manufacturer or brand-name retailer. The Panel's recommendations on the resolution of individual consumer complaints are not binding on either the company or the consumer. While MACAP's primary purpose is to help achieve a fair resolution to consumer appliance complaints, it also makes recommendations to the industry for improving consumer services and advises consumers on satisfactory appliance ownership, use, care and maintenance.

MACAP is independent of its sponsors. Panelists cannot be connected with the industry in any way. The Panel's recommendations and positions are independently developed and expressed. (For more details, contact the MACAP administrative staff at 312/984-5858.)

Appliance-Related Trade and Professional Organizations

Air-Conditioning and Refrigeration Institute
1501 Wilson Boulevard
Arlington, Virginia 22209
703/524-8800

Air Movement and Control Association, Inc.
30 West University Drive
Arlington Heights, Illinois 60004
312/394-0150

American Gas Association
1515 Wilson Boulevard
Arlington, Virginia 22209
703/841-8400

American National Standards Institute
1430 Broadway
New York, New York 10018
212/354-3300

American Public Power Association
2301 M Street, N.W.
Washington, D.C. 20037
202/775-8300

American Society for Testing & Materials
916 Race Street
Philadelphia, Pennsylvania 19103
215/299-4500

American Society of Heating, Refrigerating & Air-Conditioning Engineers
1791 Tullie Circle, N.E.
Atlanta, Georgia 30329
404/636-8400

Canadian Appliance Manufacturers Association
1 Yonge Street, Suite 1608
Toronto, Canada M5E 1R1
416/862-7152

Edison Electric Institute
1111 19th Street, N.W.
Washington, D.C. 20036
202/828-7400

Electronic Industries Association
2001 Eye Street, N.W.
Washington, D.C. 20006
202/457-4900

Gas Appliance Manufacturers Association
1901 North Moore Street
Suite 1100
Arlington, Virginia 22209
703/525-9565

Humidifier Institute
230 North Michigan Avenue
Chicago, Illinois 60602
312/236-7796

National Appliance Service Association
1308 Pennsylvania
Kansas City, Missouri 64105
816/221-1808

National Association of Retail Dealers of America
2 North Riverside Plaza
Suite 222
Chicago, Illinois 60606
312/454-0944

National Electrical Manufacturers Association
2101 L Street, N.W.
Suite 300
Washington, D.C. 20037
202/457-8400

National LP-Gas Association
1301 West 22nd Street
Oak Brook, Illinois 60521
312/986-4800

National Retail Merchants Association
100 West 31st Street
New York, New York 10001
212/244-8780

Porcelain Enamel Institute
1911 North Fort Myer Drive
Suite 1009
Arlington, Virginia 22209
703/527-5257

Sewing Machine Trade Association
c/o Singer Company
8 Stamford Forum
Stamford, Connecticut 06904
203/356-4200

Underwriters Laboratories
333 Pfingsten Road
Northbrook, Illinois 60062
312/272-8800

Vacuum Cleaner Manufacturers Association
1615 Collamer Street
Cleveland, Ohio 44110
216/851-2400

AHAM Publications

Certification Directories

Directory of Certified Room Air Conditioners. Lists all brands and models certified both residential and built-in models. The certified Btu/hr cooling capacity and amps rating are given for each model along with the Energy Efficiency Rating (based on Department of Energy test procedures) and the operating voltage. Published semi-annually. 14 pages.

Single copy — $1.00; quantities of 26 and over — 50 cents each; one year subscription (two editions) — free; additional subscriptions — $2.00 each.

Directory of Certified Refrigerators and Freezers. Lists all brands and models of certified refrigerators, combination refrigerator-freezers and freezers. Gives the AHAM-certified ratings in cubic feet volume — both total and separately for the fresh food and freezer sections — and square feet of shelf area. Also gives the type of door configuration and defrost system and the annual estimated operating cost based on Department of Energy test procedures. Published semi-annually. 20 pages.

Single copy — $1.00; quantities of 26 and over — 50 cents each; one year subscription (two editions) — free; additional subscriptions — $2.00 each.

Directory of Certified Humidifiers. Lists all brands and models certified. Gives the AHAM-certified water output capacity in gallons per 24 hours for each model. Also includes a humidification selection guide to help the consumer determine the capacity needed. Published semi-annually. 4 pages.

Single copy — 25 cents; quantities over 100 — 15 cents each.

Directory of Certified Dehumidifiers. Lists all brands and models certified. Gives the AHAM-certified water removal capacity in pints per 24 hours for each model. Also includes a dehumidification selection guide to help the consumer determine the capacity needed. Published semi-annually. 4 pages.

Single copy — 25 cents; quantities over 100 — 15 cents each.

Safety

Caution (Preventing Hydrogen Explosions). Illustrated leaflet instructs consumers returning from vacation or moving into a new home on the proper procedure to prevent explosions from hydrogen gas build-up in the hot water system. 4 pages.

Single copy — free; 100 copies — $25.00.

Follow these safety tips when using your portable electric heater. Illustrated leaflet describes precautions consumers should follow for safe use of their portable electric heater. 6 pages.

Single copy — free; for quantity orders, contact AHAM's Public and Consumer Relations Department.

The Microwave Oven: How It Works . . . Why It's Safe. Illustrated leaflet explains oven operation, the nature of microwaves, Federal safety standards and Underwriters Laboratories safety testing. 6 pages.

Single copy — 25 cents; 100 copies — 15 cents each; 500 copies — 10 cents each; 1,000 copies — $40.00.

Stop . . . Help Save a Child's Life. Illustrates four easy ways to make an empty refrigerator or freezer safe for unsuspecting children. (As part of AHAM's Child Entrapment Prevention Campaign, manufacturers place the leaflet in each new refrigerator and freezer as a reminder to safely discard the old unit.) 6 pages.

Single copy — free; 1,000 — $20.00.

Appliance Purchase

Cooling Load Estimate Form: Facts You Should Know About Room Air Conditioners. A form for calculating the proper Btu/hr cooling capacity for the individual consumer's needs. The 11 steps in the calculation involve window and wall outside exposures, room size in square feet, insulation, number of occupants in the room and lights and electrical equipment used. Also discussed is Energy Efficiency Rating (EER), installation requirements and efficiency use and maintenance tips. 4 pages.

Single copy — 35 cents; 100 copies — 25 cents each; 500 copies — 15 cents each; 1,000 copies — $80.00.

Cooling Load Guide, Square Foot Method : Facts You Should Know About Room Air Conditioners. Discusses Energy Efficiency Rating (EER), installation requirements and efficiency use and maintenance tips. Includes a simplified calculation form for determining the cooling capacity needed using the "square foot method." (Note: The results obtained are not as accurate as those obtained with the longer "cooling load estimate form" listed previously.) 4 pages.

Single copy — 35 cents; 100 copies — 25 cents each; 500 copies — 15 cents each; 1,000 copies — $80.00.

Consumer Selection Guide for Room Air Conditioners. Discusses key facts to consider before purchase — window types, Btu/hr capacity, electrical requirements and energy efficiency. Provides tear-out form for calculating capacity needed. Lists individual brands and models by window type, capacity, volts and EER (from highest to lowest). Published annually. 16 pages.

Single copy — $1.00; quantities up to 49 — $1.00 each; 50 to 200 copies — 90 cents each; over 200 copies — 80 cents each.

Consumer Selection Guide for Refrigerators and Freezers. Discusses key facts to consider before purchase — storage capacity, defrost system, door style and energy cost. Lists individual brands and models by door style, capacity and annual operating cost (lowest to highest). Published annually. 12 pages.

Single copy — $1.00; quantities up to 49 — $1.00 each; 50 to 200 copies — 90 cents each; over 200 copies — 80 cents each.

Energy Conservation

Guidelines for Communicating with Consumers About the EnergyGuide Appliance Labeling Program. Describes the Federal Trade Commission's mandatory appliance energy labeling program. Questions consumers may have about the "EnergyGuide" label are answered. The label is illustrated and its various parts explained. 8 pages.

Single copy — 60 cents; 2-25 copies — 60 cents each; 25-100 copies — 40 cents each; quantities over 100 — 35 cents each.

Saving Energy With Your . . . Suggestions for consumers to follow in purchasing a new appliance and using and caring for their existing appliances to save energy.

Dishwasher. Single copy — 50 cents; 2-24 copies — 50 cents each; 25 or more copies — 25 cents each.
Refrigerator and Freezer. Single copy — 50 cents; 2-24 copies — 50 cents each; 25 or more copies — 25 cents each.
Range. Single copy — 50 cents; 2-24 copies — 50 cents each; 25 or more copies — 25 cents each.
Room Air Conditioner. Single copy — 50 cents; 2-24 copies — 50 cents each; 25 or more copies — 25 cents each.
Home Laundry Equipment. Includes information on automatic clothes washers and dryers. Single copy — 50 cents; 2-24 copies — 50 cents each; 25 or more copies — 25 cents each.

Facts on Major Home Appliance Energy Consumption and Efficiency Trends. Explains appliance energy efficiency, compares residential energy consumption to total U.S. consumption, and describes trends in major appliance energy consumption and efficiency through tables and charts.

Single copy — free; 2-20 copies — 60 cents each; quantities over 20 — 50 cents each.

Service

Your Career as an Appliance Service Technician. Discusses potential benefits and advantages in appliance service, required training and skills, employment opportunities, earnings and advancements, sources for additional information and assistance. 16 pages.

1-25 copies — 75 cents each; 25-100 copies — 70 cents each; quantities over 100 — 50 cents each.

Performance Measurement Standards

DH-1 — Dehumidifiers (ANSI/AHAM DH-1-1980) $3.50
DW-1 — Household Dishwashers (ANSI/AHAM DW-1-1982) $3.50
DW-2PR — Plumbing Requirements for Household Dishwashers (ANSI/AHAM DW-2PR-1980) $3.50
ER-1 — Household Electric Ranges (ANSI/AHAM ER-1-1980) $3.50
FWD-1 — Performance Evaluation Procedure for Household Food Waste Disposers (ANSI/AHAM FWD-1-1983) $3.50
FWD-2PR — Plumbing Requirements for Household Food Waste Disposer Units (ANSI/AHAM FWD-2PR-1980) $3.50
HLD-1 — Performance Evaluation Procedure for Household Tumble Type Clothes Dryers (American National Standard A197.6-1975) $1.00
HLW-1 — Performance Evaluation Procedure for Household Washers (ANSI/AHAM HLW-1-1980) $3.50
HLW-2PR — Plumbing Requirements for Home Laundry Equipment (ANSI/AHAM HLW-2PR-1980) $3.50
HRF-1 — Household Refrigerators, Combination Refrigerator-Freezers, and Household Freezers (ANSI/AHAM HRF-1-1979) $5.00
HU-1 — Appliance Humidifiers (ANSI/AHAM HU-1-1980) $2.50
RAC-1 — Room Air Conditioners (ANSI/AHAM RAC-1-1982) $3.50
TC-1 — Performance Evaluation Procedure for Household Trash Compactors (ANSI/AHAM TC-1-1984) $3.50
AC-1 — Method for Measuring Performance of Portable Household Electric Cord Connected Room Air Cleaners (AHAM AC-1-1984) $3.50
CI-1 — Method for Measuring Performance of Household Electric Curling Irons (ANSI/AHAM CI-1-1981) $2.50
***CM-1** — Method for Measuring Performance of Household Electric Coffee Makers (AHAM CM-1-1984) $2.50
***CO-1** — Method for Measuring Performance of Household Electric Can Openers (AHAM CO-1-1984) $2.50
***FB-1** — Method for Measuring Performance of Household Electric Food Blenders (AHAM FB-1-1984) $2.50
FM-1 — Method for Measuring Performance of Household Electric Food Mixers (ANSI/AHAM FM-1-1980) $2.50
***FP-1** — Method for Measuring Performance of Household Electric Frypans (AHAM FP-1-1984) $2.50
HD-1 — Method for Measuring Performance of Household Electric Hair Dryers (ANSI/AHAM HD-1-1980) $2.50
***I-1** — Method for Measuring Performance of Electric Irons (AHAM I-1-1984) $3.50
***T-1** — Method for Measuring Performance of Household Electric Toasters (AHAM T-1-1984) $2.50
***WBSG-1** — Method for Measuring Performance of Household Electric Waffle Bakers/Sandwich Grills (AHAM WBSG-1-1984) $2.50
MA-1-PS — Pre-Shipment Test Standard for Packaged Major Appliances (ANSI/AHAM MA-1-PS-1980) $3.50
SI Metric Practice Guide for the Appliance Industry $1.00

(Standards Under Development)

Performance Evaluation Procedure for Microwave Cooking Appliances
Sound Measurement and Rating Standard for All Appliances
Household Electric Food Processing Machines

*Pending reaffirmation as American National Standard.

Since AHAM does not bill for orders under $5.00, please include remittance if your order is less than that amount. (Note: Prices given for quantities do not include charges for postage or freight. These will be added to your order.)

Appendix 1 SIC Codes

The Standard Industrial Classification (SIC) identifies U.S. industries by type of activity to promote uniformity and comparability of statistical data. Industries are defined according to the composition and structure of the economy, covering all economic activities. Major home appliance products with their respective SIC Codes are:

Refrigerators	36321
Freezers	36322
Electric Ranges and Ovens	36311
Gas Ranges and Ovens	36313
Microwave Ovens	36311
Clothes Washers	36331
Clothes Dryers	36331
Dishwashers	36394
Food Waste Disposers	36394
Trash Compactors	36394
Dehumidifiers	35856
Room Air Conditioners	35856

Appendix 2 Other Home Appliance Products Within AHAM's Scope

Portable Home Appliances (Small Electrics):

Food Preparation:
Bagmaker/Sealers
Blenders
Can Openers
Coffee Mills/Grinders
Combination Appliances
Food Grinders
Food Mixers (Stand)
Food Mixers (Portable)
Food Processors
Food Slicers
Ice Cream Freezers
Ice Crushers
Juicers
Juice Extractors
Knives
Knife Sharpeners

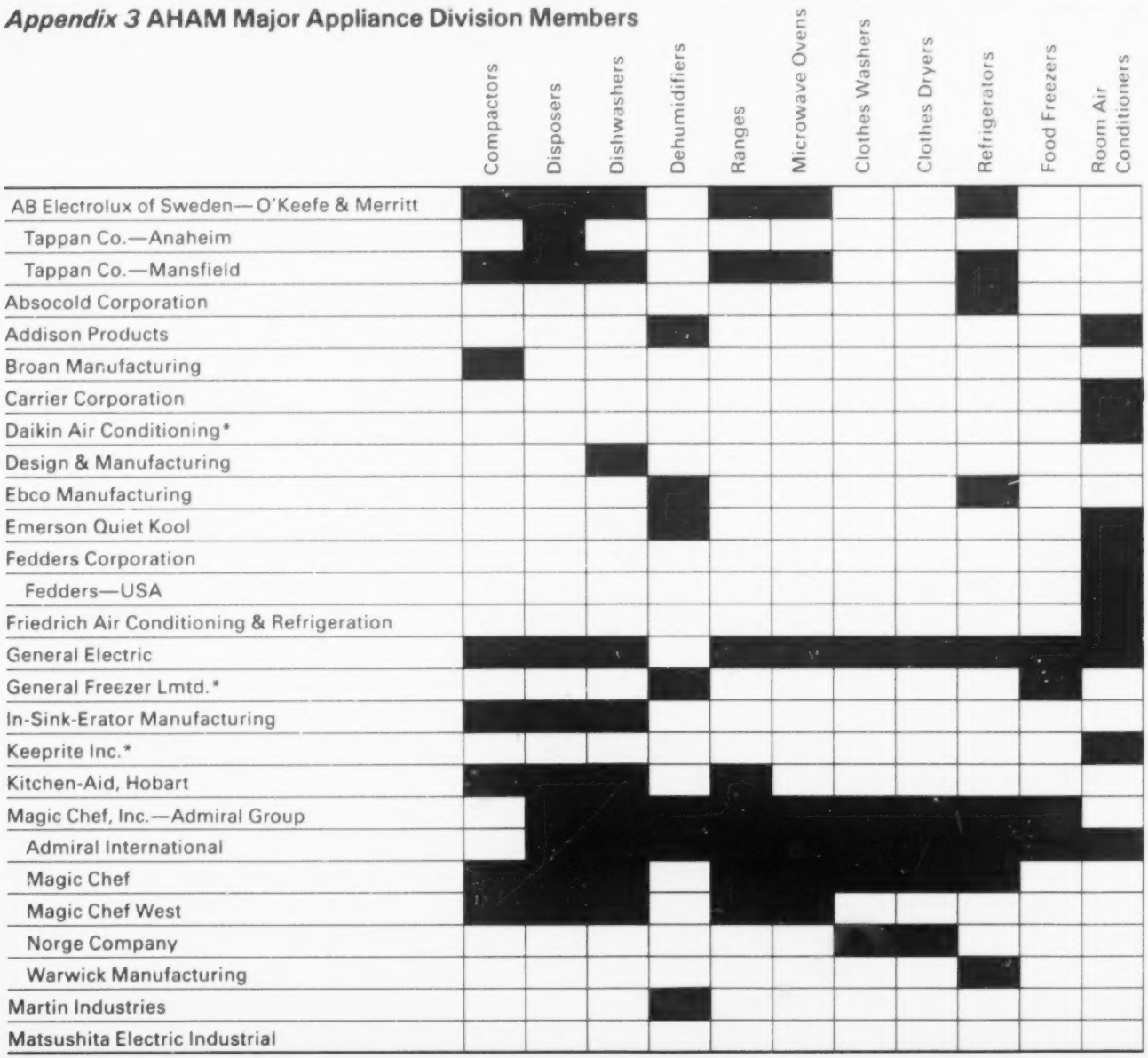
Air Treatment:
Air Cleaners
Air Heaters
Fans
Humidifiers (Non-Central)
Vaporizers

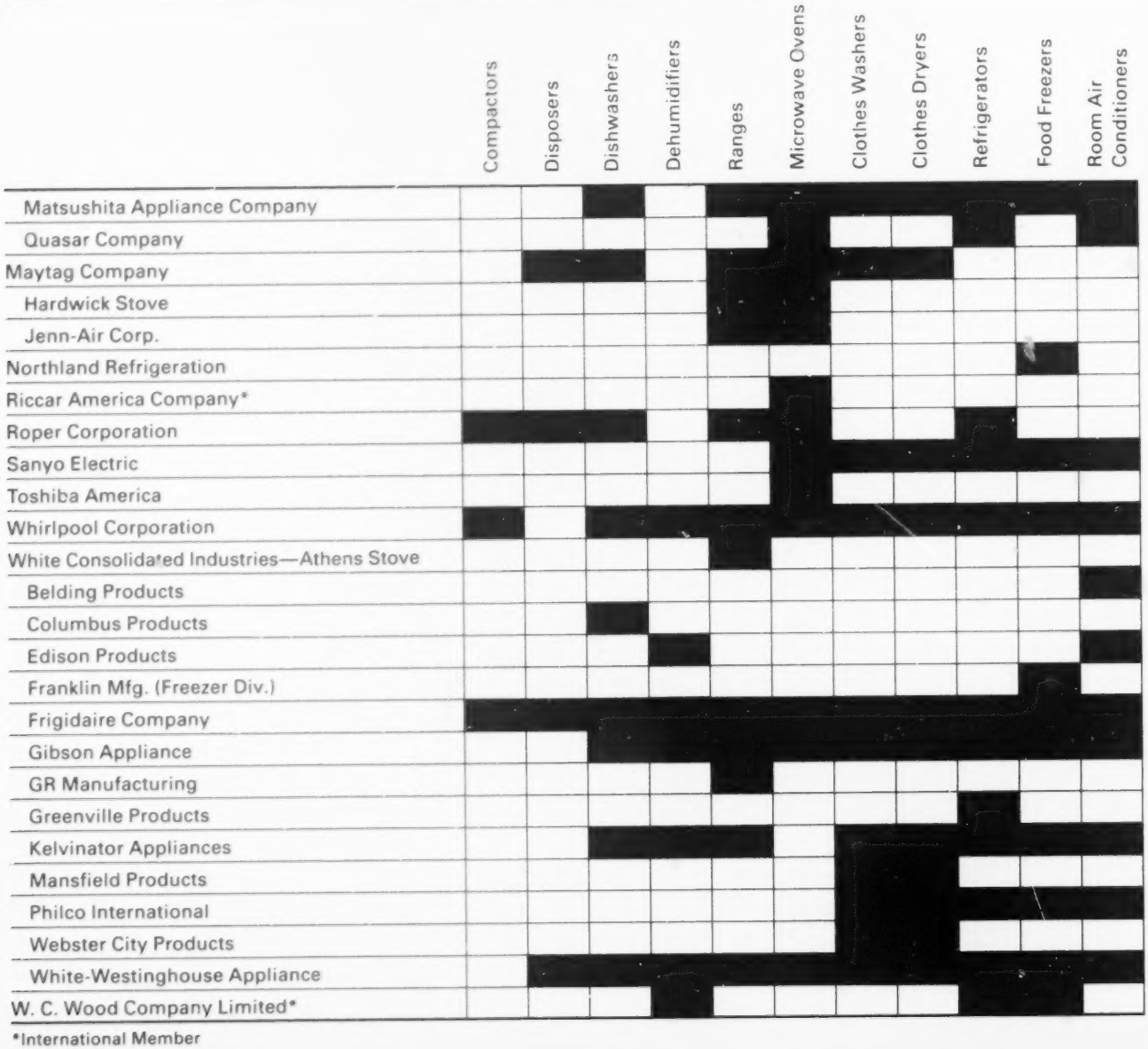
Cooking:
Broilers
Coffeemakers (Perc)
Coffeemakers (Drip)
Coffeemakers (Urn)
Cookers (Multi-Purpose)
Corn Poppers
Countertop & Convection Ovens
Deep Fat Fryers
Fondues
Food Steamers
Fry Pans (Skillets)
Griddles
Hot Plates
Kettles
Slow Cookers
Toasters
Toaster/Ovens
Toaster/Oven/Broilers
Waffle Irons
Woks

Personal & Garment Care:
Curling Irons/Brushes
Hair Clippers
Hair Dryers
Hair Setters
Irons
Lighted Mirrors
Massagers
Steam Wands
Toothbrushes

Note: Vacuum cleaners, sewing machines and electronic products such as radios, televisions, stereos and videos are also considered home appliances, but are not in AHAM's product scope.

Appendix 3 AHAM Major Appliance Division Members





*International Member

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